

# PRESUPPOSITIONS AND PRACTICAL REASON

## A Study in Decision-Theoretic Semantics

Arthur Merin

Department of Philosophy  
University of Konstanz

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**Abstract:** What is it to presuppose? Why let someone presuppose? Why presuppose, yourself? To give some answers, we assume that assertoric discourse has a useful explication within a Decision-Theoretic Semantics. We begin with the epistemic notion of the *a priori* and with the practical philosophy—ethics in the Kantian sense—of accommodating someone who is taking things for granted. We then relate both to decision theory. Setting out from its key principle of maximizing expected value, we specify notions of valuational and evidential relevance, distinguish evidential time from causal time, and identify probabilistic presuppositions as a generalization of familiar, deterministic presuppositions. We relate presuppositions to the Markov property of stochastic processes and explain existential prejudices of Wh-questions. We explicate issue-based communication and a notion of proper accommodability by immediate irrelevance of the accommodatum to the principal issue. We differentiate positive from negative presuppositions and show when and how proper accommodation of the latter raises relevance of an assertion to an issue, illustrating with a putative duke of Paris. We identify purported cases of implicature as probabilistic presuppositions and show that a longstanding taxonomic objection to Gerald Gazdar's well-known 'Cancellation' (or: Accommodation-Blocking) account of presupposition projection is otiose. Appendix 1 contains proofs. Appendix 2 shows that the counterexamples to Gazdar offered in the literature are not what they are held to be. The essay includes expositions of work by R.G. Collingwood and Oswald Ducrot.



‘Would you kindly step aside for a moment’, someone might ask you. They are carrying a heavy load, and of course you accommodate them.

Things *might* happen this way. In fact, how they do happen most of the time is a little different, as you well know. Being a perceptive sort of individual, you will have obliged the other party already in advance of their having to say anything at all. Even better, when they turned around to thank you with a ‘Much obliged!’ or ‘*Obrigado*’, what you will have told them is: ‘Don’t mention it’, or ‘*De nada*’. And that is much like saying: ‘I was as good as there already’—‘there’ being wherever you had to be to accommodate them.

But suppose ‘there’ had been a railway track with a train approaching fast, the train already being close enough for you to see the whites in the engine driver’s eye. Would you have moved? Would they have asked you to move? Could they have expected you to move in advance to accommodate them? Very likely not. Alternatively, suppose that what they are carrying in their bag is your daughter’s 1792 bootleg edition of Kant’s *Kritik der Urteilskraft* and her cuddly toy, which are both lawfully hers and which she has not lent or signed away to anyone. Should you have stepped aside, had you known what was in the bag?

The pertinence of these tales and their attendant moral problems to the topic of presupposition will be obvious—or at any rate, less unobvious—on realizing that they are all about taking things for granted. Taking things for granted is just what we do when we presuppose one thing or another in the course of discourse and when we expect the addressee to let us do so without question. I shall, accordingly, explore how the abstract forms which underlie these fragments of urbane mythology and ritual inform the phenomenology of presupposition. Indeed, I will propose that they should inform its very theory.

That presuppositions are beliefs, or that they are at least representable as beliefs, will not be forgotten. Sections 2 to 12 submit technical considerations on the doxastic properties of presuppositions, some of which may be new enough. However, the framework within which they are presented—the framework of individual and interactive decision theory—will be such as to articulate beliefs throughout with matters of strategy or tactics, either directly or at one short remove.

Strategy and tactics are commonly conceived of as the hard little opposite numbers of the moral point of view. But of course they are inconceivable as being such, when no reference is made to this point of view. The interplay of what Kant, respectively, called pragmatic and practical reason<sup>1</sup> is subtle at the best of times and both aspects of human nature should be given a hearing in the study of the language faculty.

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<sup>1</sup>Kant (1785, 1788).

The present essay is by no means comprehensive of the vast subject of presupposition. Its main aim, as usual for the genre, is to add to the extant literature, and sometimes to detract from it. Some literature I have in mind for adding to is philosophical work on the *a priori*. It is my hope that attention paid to interactive aspects of apriority, which are in some sense prior to the acquisition of explicit knowledge—both *a priori* and *a posteriori*—will return some practical fibre into an increasingly rarefied epistemological debate.<sup>2</sup> The principal practical question I should like to address, within the ambit of communication by means of natural languages is this:

What is the rule of conduct, a rule which you, the generic stakeholder in the social institution called English (or Portuguese, or whatever) could intend to be a general law of conduct, under which you should decide whether to take things for granted *from* others and let things be taken for granted *by* others.

The traditional concept of the *a priori* which derives from the scholastics, from Leibniz, and finally from Kant is epistemological. A proposition is known *a priori* if it can be known without appeal to ‘experience’, meaning empirical experience. The centroid current sense of apriority is close to that of Leibniz, who spoke of ‘truths *a posteriori* or of fact’, and ‘truths *a priori* or of reason’.<sup>3</sup> One question, accordingly, has been: ‘What is experience?’. Useful answers to it seem to be available only on the basis of case-by-case argument (the cases being physics, arithmetic, geometry, morality, etc.). For Hume, experience and experiment came to the same thing and introspection was fully part of it. The slender common ground among philosophers who find the distinction *a priori* vs. *a posteriori* useful has been that propositions or judgments *a posteriori* cannot, in general, be taken for granted. They constitute learning. Their exposition and their being brought to consciousness is not a mere reminder<sup>4</sup> of something that no-one in their right mind could *fail* to know, and that no-one at all could fail to *know*.

Knowledge *a priori* is not truer than knowledge *a posteriori*.<sup>5</sup> But the belief that one knows, which is the best we can act on, is less apt to be

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<sup>2</sup>See e.g. Boghossian & Peacocke (2002).

<sup>3</sup>Leibniz (1765), IV,9. But there are differences. Leibniz’ context are ‘first truths’ of each kind (our own existence vs. tautologies), each unprovable and immediate. Recall now that Kripke (1972) would hold an expression of the first kind (‘I am here now’) to be true contingently, but known *a priori*. Kripke gave striking affirmative answers to two questions (for which see e.g. Hamlyn 1967): Can there be truths known *a priori* that are not necessarily true, and can there be necessary truths that are not known *a priori*?

<sup>4</sup>As a geometrical proposition was supposed to be for the slave boy in Plato’s *Meno*.

<sup>5</sup>This is true when we specify the latter with all the caution due in the face of ineluctable measurement error.

shown false if its object is knowledge a priori. It can be expected to remain resilient under changes in our knowledge base. Empirical knowledge which cannot aspire to lawlike status cannot be expected to do so, by and large. There is no discovering that Ohm's Law and two being a square root of four were hallucinations. By contrast, the present appearance-in-print of the word strings denoting them might have been a figment of your imagination. Likewise, it is most unlikely that the wax-tablet of your memory will melt down in parts and reconstitute itself so as to turn, for you, three into a divisor of two. By contrast, it might well reconfigure itself so as to convince you that you are Albert Schweitzer, or Mother Teresa, or a brain in a beer stein.

The epistemologist's concept of aprioricity is by and large modelled on the predicament of the much-maligned Cartesian cognizer who pretends, for argument's sake, to be threatened by prolonged hallucinations.<sup>6</sup> Our present approach to the *a priori*, focussing on language and verbal conduct, will choose a different perspective. It will not ask 'What can we take, no questions to be asked, from ourselves or, more particularly, from our senses?', but rather, 'What can we thus take from others?' and 'What can we rightly and righteously expect others so to take from us?'. Descartes' *malin génie*, whom Russell sought to banish with 'knowledge by acquaintance',<sup>7</sup> gives way to cunning or just ill-informed acquaintances—coming in various degrees of intimacy and good will, or ill.<sup>8</sup>

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<sup>6</sup>Like those which had taken over Cervantes' Bachelor of Arts, Vidriera, who insisted that he was made of glass and took care of himself accordingly. Descartes alludes to him in the *Meditations*, and the multitude of seals of clerical and royal approval which precede Cervantes (1613), the collection containing the eponymous novella, are worth looking at for what they imply about the Cartesian environment, on which see note 8 below.

<sup>7</sup>Descartes, First Meditation (1647:[17]): '*...un certain mauvais génie, non moins rusé & trompeur que puissant ...*'. The Latin original of 1641 (ed. Adam/Tannery [AT] Vol. VII at p. 22) has *...genium aliquem malignum, eundemque summe potentem & callidum ...*, i.e. 'some malign spirit, as powerful as he is cunning'. Acquaintance is spelt out in Russell (1911) as being restricted to concepts and sense data (as distinct from extra-mental entities).

<sup>8</sup>Sure enough, AT (Vol. VII, p. 22nn) reference—without comment, but twice—a letter from Descartes to his polymath friend, the Rev. Marin Mersenne, dated August 6, 1640, (AT Vol. III, at p. 147). Referring to a fellow-academic, the Rev. Bourdin, Descartes goes on to vow: "But regarding those who try to persuade their audience that I have written things which they know full well I have never written and who then refute them as my assertions, I will try to make sure that their malign intent (*mauvaise volonté*) does not remain unknown to anyone." The influential Rev. B and his citation circle are the subject of continued correspondence, in which Descartes expands on B's deceptive practices (*'mauvaise foi'*). Letters are addressed to Mersenne, to the Rector of B's Jesuit College, and finally to Dinet, the Jesuit superior of the Paris region, entreating him to read Descartes for himself rather than rely on the "Reverend Father" (Bourdin). Bourdin

The element of righteousness may look somewhat out of place in epistemology and even more so in the theory of language.<sup>9</sup> But to a Bayesian,<sup>10</sup> our readiness to act on a belief, a tendency by which its real doxastic and epistemic status is perhaps most reliably known to us after the fact, is always dependent on how we disvalue the consequences of being wrong. We can be wrong in either of the two ways we can go wrong in answering a yes-no question and acting upon the answer: a mistaken ‘yes’ and a mistaken ‘no’. Recent contextualist doctrines of knowledge attribution rediscover this paradigm of hypothesis acceptance in less formal terms.<sup>11</sup>

Outcomes of acts, for which acts are ultimately valued under a decision-theoretic perspective, are evaluated in line with the agent’s preferences or, equivalently, desires. The desires of a Bayesian can be as altruistic as one pleases.<sup>12</sup> Moreover, the hardest of derivations of the moral point of view from transformations of naively self-centered preferences continues to be the ‘Golden Rule’ symmetry argument. This argument was explicated by Vickrey, Harsanyi, and Rawls in terms of a veil of ignorance behind which our own position in a proposed social set-up is hidden from us.<sup>13</sup>

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is the author of the ‘7th Objections’, conveyed by Mersenne, to which Descartes replies in the second, 1642 edition of the *Meditationes*, where he also prints the letter to Dinet. See Lenoble (1943:46-49) for a humorous glance at the affair, which for a while might well have seemed like a waking nightmare to the first Cartesian.

<sup>9</sup>At least when it is introduced *fortissimo*. That a knowledge claim is an assumption of responsibility and that assertions imply knowledge claims is a familiar doctrine (see Williamson 2000 for a yet sharper statement of it). Indeed, the Conversational Maxims of H.P. Grice (1989), enjoining truthfulness, warrant, informativeness, relevance and perspicuity are, if anything, moral injunctions. However, the relationship between these practical injunctions and their pragmatic background has not been uppermost in the teachings of the school that Grice founded, and perhaps not in the founder’s conversational works either. Coordinating activities and making yourself understood in being on your best cooperative behaviour is not the sole pragmatic aim of talk, and perhaps not even the most interesting one from either the moral or the explanatory point of view.

<sup>10</sup>E.g. Jeffrey (1965, 1992); not forgetting Wald (1947), a Bayesian in apparent practice though not by profession.

<sup>11</sup>On the doctrine, see Lewis (1996) for references and development, notably for an elegant formulation of facticity as a reasonableness condition. On the claim, see my ‘Contextualist Theories of Knowledge, Signal Detection Theory, and Naturalized Epistemology’. Abstracts of GAP5, Fifth International Congress of the German Society for Analytical Philosophy, Bielefeld Sept. 2003. Online as [www.gap5.de/Abstracts-PDFs/Abstracts.gesamt.pdf/Merin.pdf](http://www.gap5.de/Abstracts-PDFs/Abstracts.gesamt.pdf/Merin.pdf)

<sup>12</sup>Of course, they could also be wholly egotistical, and even entirely unpalatable to the tasteful person.

<sup>13</sup>Vickrey (1945), Harsanyi (1953, 1955); Rawls (1957, 1971). Vickrey (almost in passing, and spotted late by Arrow 1973) and, much more fully so, Harsanyi each offer a Bayesian solution to this problem. They impute cardinal utilities and ask you to think it equiprobable that you might be in any position ranging from most to least advantaged.

A practical approach—practical in the Kantian and academic philosophical sense—is not, then, incompatible with a decision-theoretic approach to meaning. Neither does it imply that our basic paradigm of interaction is a coordination game of pure cooperation as explicated by Lewis (1969).<sup>14</sup> On the contrary: our task will be to see how practical aspects of meaning may emerge in situations which are pragmatic not least in the sense of being governed by competing personal interests.

This brings me to the more language-centered literature of recent years on presupposition. My points of reference will be represented by three surveys which between them reflect the published state of the art.<sup>15</sup> They all belong squarely enough to the field of linguistics, though one of them, Beaver's, retains a serviceable link with the recent philosophical tradition.

The link goes back to the time, some thirty years ago, when quite a few philosophers still worried about presuppositions in the language-centered sense. With the recent absorption of philosophy of language into the metaphysics of mind, such concerns are no longer uppermost in driving the philosophical imagination.

One cannot perceive this development as a sign of unmitigated progress, for it has been accompanied by a gradual withering away of exploratory phenomenology, of which a good size portion is found in all the great philosophers of the past. There is only so much you can do with variations on Locke's transmigrated soul and inverted colour percepts, with retreads of Descartes' original version of the brain-in-a-vat, or with translations into the Chinese Room format of Leibniz' moving machine parts inside thinking matter; i.e. not much. There is a lot you can discover in language, as you can in mathematics, parts of which are philosophical even to this day.<sup>16</sup>

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This has utilitarian consequences: your choice will be an allocation that maximizes the sum of individual, position-specific utilities. Rawls proposes a maximin solution: always imagine yourself in the most disadvantaged position. This has strongly egalitarian consequences: choose that act which improves the worst off person's or group's position. The two proposals usually agree (maximin being a special case of the first), but when they do not, they can be either unworkable or unreasonable in some circumstances. See Arrow (1973), Harsanyi (1975). 'Do as you would be done by', says the Golden Rule; and I propose to keep it in mind when considering the form of constraints on accommodation.

<sup>14</sup>One way to illustrate the coordination game approach to discourse which informs the main drift of Lewis (1979)—its title and the rider 'provided no-one objects' notwithstanding—would be to say that it turns assertion into an instance of accommodation.

<sup>15</sup>They are Kadmon (2001), which is accessible; Geurts (1999), which is careful and detailed on many key issues; Beaver (1997), which is indispensably comprehensive, but very dense going, and for which Beaver (1999) unpacks empirical material. Kadmon's book is affordable and wide-ranging enough to become a student text, perhaps most usefully so with some critical supplement.

<sup>16</sup>Logic, for one. The process of discovery and its potential for teaching us genuine

To adapt the famous line from Kant, a linguistic theory of meaning without philosophy is at best partially sighted. Indeed it would be nowhere at all without the past contribution of philosophers. In return, a philosophy of mind and language which does not pan out to make a difference to our appreciation and explanation of the small fry of language phenomena rings hollow and is really no better off. In fact, it might be even more severely handicapped. In staying aloof from the small detail of use, it will be circumscribing its range of implications to a set of ideas which are too easily domesticated to offer much resistance to opinionation. This point is well made, though perhaps indavertently, once more by Kant, and in the very passage that introduces our object of inquiry into the modern literature:

If a dogmatical affirmative or negative answer is demanded ... [and] if it happens that in both cases the answer is mere nonsense, we have in this an irresistible summons to institute a critical investigation of the question, for the purpose of discovering whether it is based on a groundless presupposition and relates to an idea, the falsity of which would be more easily exposed in its application and consequences than in the mere representation of its content.<sup>17</sup>

It is to application and consequences that we turn when we examine the detailed workings of parts of mind, as manifested in its most intricate of manifestations. Had philosophers of nature felt it to be too tiresome to go into such detail, we should be doing Aristotelian or Pre-Socratic physics to this day. Why treat the mind with less respect?

In the present essay, I explore the consequences of a philosophy of mind which remains committed to the familiar, everyday view. On this view, mindful agents act in line with beliefs and desires that are subject to certain coherence constraints. Frank Ramsey was a pioneer of turning this unsurprising idea into an interesting version of (as he saw it) theoretical psychology. Part of the enterprise was an attempt, sketchy but intelligible, of founding the theory of meaning on this basis rather than on ultimate, irreducible truth conditions. Other philosophers were inspired by it in various ways; see Loar (1980) for an exposition and development of the idea.<sup>18</sup>

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news is quite independent of whether or not we take a psychologistic stance (as we might for natural language) or a resolutely antipsychologistic stance (as we generally do for mathematics including logic).

<sup>17</sup>Kant (1787:B513), trsl. Meiklejohn. The suspicion of inadvertence is grounded in the fact that Kant's own presuppositions were effectively undercut by research extending his philosophical ambit, that is, by new findings in abstract geometry and in theoretical and experimental physics.

<sup>18</sup>Cf. Merin (1999a,b) for formal literature, less directly inspired by Ramsey.



My specific aim in the present essay is threefold and is reflected in the distribution of sections. The centrepiece is an application of what I call a Decision-Theoretic Semantics to some issues in the compositional treatment of presuppositions. In particular, I work up to addressing a problem known as the ‘projection problem’. This piece occupies Sections 2 through 12 and readers who are pressed for time are advised to concentrate on them. The sections are formal in parts, and some of them are concise enough to be read as a quick technical update. Related to the projection problem, though able to stand alone, Section 9 offers a new, syntax-independent rationale for the observed preference for the narrow negation scope reading of Russell’s royalist sentence type. All technical apparatus for these sections is briefly introduced in the main text, and more detail is accessible from any introductory treatise on probability.

Section 1, by contrast, gives a slow and in parts historical introduction. Like the pre-amble to the end of which we have now almost come, it takes a philosophical stance. The key to understanding the language phenomena dealt with in Sections 2 to 12 is rooted there, much as the consequentiality of the philosophical stance is, I believe, seen in the phenomena. Section 13, which takes up again some of the themes of Section 1, is a summary of sorts, and an outlook. Appendix 2, by renewed contrast, is full of data. Readers who want some light relief from earlier sections might wish to turn to it at any time. However, it also contains some observations of general theoretical import (and a bit from Kant) which are of interest only when preceded by a lengthy phenomenological exercise.

Finally, it will be obvious that I like writing footnotes. They often digress, and surely not in line with everyone’s idea of relevance. But digression is the very purpose of footnotes,<sup>19</sup> and I trust that readers in a hurry will stride ahead on top of them.

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<sup>19</sup>Naturally, in the service of intellectual progress.

## 1. On Presupposing

Presuppositions come in diverse kinds, but each exemplar of the genus is a judgment or conviction *a priori*. If it has metaphysical or, as Kant put the matter, transcendental ambitions, such an exemplar will be ‘independent of experience’.<sup>20</sup> But presuppositions may be less ambitious, and *a priori* in a way more down to earth. Any proposition that happens to be taken for granted at some point in talk or deliberation will be *a priori* in this sense. It might be taken for granted on grounds of past experience or of expediency, or for any other reason.

Presuppositions as recognized in linguistics traditionally occupy a middle ground. They are usually associated with, or ‘triggered’ by, certain narrow classes of lexical expressions or collocations and become presuppositions of all the parties to a discourse (are ‘projected’) if nothing in their sentential or extrasentential context stands in the way of their being thus taken for granted.

A rough, but concise taxonomy of linguistic presuppositions is given by Kadmon (2001:222), of which the first three taxa make up most of this middle ground: (i) ‘hard core’ (existence presumptions of definite descriptions and cleft sentences; antecedent eventualities of *stop* and *too*); (ii) ‘factive’ (veridicality of complements triggered by *know*, *regret*, *discover*, *forget*); (iii) ‘unentailed but triggered’ (actual falsity of subjunctive antecedents; intimations of *promise*, *before*); and (iv) ‘heavily context-dependent’ (i.e. relevant lawlike or regular world knowledge).<sup>21</sup>

Whatever the grounds for taking things for granted happen to be: to the extent of being taken for granted, a presupposition is beyond all clear and present doubt.<sup>22</sup>

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<sup>20</sup>Kant (1787:B3f.). What ‘experience’ might be is a question we have barely raised, above, in passing reference to Hume. For facets of the notion in Descartes, see Röd (1971:80-85) or search the anglophone literature. Leibniz also speaks of ‘*a priori* proof’ as independent of experience (Leibniz 1686:[87]); and recall the earlier note.

<sup>21</sup>Karttunen (1971) classed *discover*, *forget* under a separate category of ‘semi-factives’; but Stalnaker (1974) showed how much the distinction depends on the phenomenology of context.

<sup>22</sup>To a philosophical adherent of Bayesian epistemic doctrine (Bayes 1763; Jeffrey 1992), today’s ‘prior’ probability function representing one’s belief state is yesterday’s ‘posterior’ probability function, that is: yesterday’s prior conditioned on yesterday’s news. Some philosophers have inferred by backward induction that there must be some kind of ur-prior representing a pure news-free, optimally rational inductive policy for belief formation, i.e. a kind of Belief Acquisition Device (cf. e.g. Carnap 1950). To the extent that we could call the constraints on such an ur-prior presuppositions—as we should do, if an ur-prior exists—we should have to call them *a priori* in a strict, Kantian sense. Carnap went on to liberalize his demands on priors, and thereby their aprioricity (cf. Carnap & Jeffrey 1971).

This attitudinal priority treatment validates the familiar tests for presuppositions  $\Theta$  which may attach to proper use of a sentence  $S$  in discourse. Any such  $\Theta$  must be held to be mutually accepted—actually or ostensibly—in the antecedent context of speaker or speaker-hearer commitments.<sup>23</sup> The tests of presuppositional status of  $\Theta$  are persistence of  $\Theta$  under denial of  $S$  (to  $\neg S$ ), under questioning ( $S?$ ), and under embedding of  $S$  in certain other dubitative environments: in the scope of a possibility predicate, as a disjunct, or as the antecedent of a conditional.<sup>24</sup>

Doxastic or deontic priority need not imply temporal priority. The legal adage, *lex posterior derogat lex anterior* and the term ‘recognition of error’ would be solecisms if there was such an entailment. Yet priority of a temporal kind is implied at least on a literal reading of ‘taking things for granted’.

The most obvious reason for taking things for granted is that they *have been* granted. The grantor in a discourse may have been the addressee; or else the speaker himself, with the addressee in the role of grantee.

Example: *Kim has been seen to beat her spouse*, says Alpha. *Yes*, concedes Beta the veridical entailment, namely that Kim has been beating her spouse, only to rejoin, *but she’s stopped beating her*. This retrospective quality of presuppositions is akin to anaphora, a point developed by Rob van der Sandt (1992).<sup>25</sup>

Yet even if things have not already been granted, we act as if they had been: in *taking* them for granted. This is retroactive presupposing, as one should call it for reasons to which the present section adds one or two. Following Lewis (1979), it is commonly referred to as ‘accommodation’,<sup>26</sup> and when we must appeal to it, the neat analogy with anaphora comes apart: sometimes in a hairline crack, sometimes in a rip.

Coming apart is not simply a question of defying Occam’s Razor and suffering the consequences. Our response will also affect how we apportion our attention within the cluster of features that characterize presuppositions, and what explanatory role we are prepared to give one or the other of them. Virtual anaphora might be like a tried and tested, prescription-free soporific. They may be free of harmful physiological side effects, but might yet deny us the intellectual benefits of creative anxiety.

<sup>23</sup>But see below for Gazdar’s (1979) neo-positivist demurrals.

<sup>24</sup>Of these, the association of presuppositions with questions is probably the oldest and, as we shall see, probably the most fundamental. ‘Have you lost your horns?’ is Eubulides’ sophism, and Kant (1787:B513), in the passage quoted above, uses the term *Voraussetzung* in much this sense in his discussion of the antinomy of pure reason.

<sup>25</sup>And to be assessed below in methodological terms.

<sup>26</sup>Though some prototypical examples are also dubbed instances of ‘bridging’, after Clark (1977).

The impression one gets from Lewis—and one whose generality and automaticity lends itself to filling in by way of a postulated insertion of an anaphoric antecedent in a representational model of context—is that it is the context which accommodates to an assumption. But this cannot be quite right yet.

Accommodation of a presupposition, as Kripke (n.d.) noted in comment on Lewis' term, requires that the addressee accommodate the speaker, somewhat as in humouring someone.<sup>27</sup> Let us specify: the accommodator waives his constitutional right to challenge a proposed transformation of the context, a right which is constitutive of orderly discourse (cf. Merin 1994a). But an addressee cannot be expected to accommodate the speaker over an indefinite range of requests, ever so polite as they may be. He cannot be expected to grant just anything, gratis. Much less, then, can he allow it to be taken for granted.<sup>28</sup> Hence, a speaker who presupposes some  $\Theta$  and expects the addressee to accommodate him should be more or less within his rights to take  $\Theta$  for granted.

Among possible reasons for an accommodative waiver of addressee's rights to objection, three stand out:

- (A)  $\Theta$  has already been granted previously.
- (B)  $\Theta$  is not an imposition at all.
- (C)  $\Theta$  is not perceived as an imposition, or is perceived at most as an insignificant imposition.

Cases (A) and (B) ought to be seen as degenerate instances of case (C). In case (A), there is in fact no right to objection. It is an instance of the rule *pacta sunt servanda*,<sup>29</sup> and our presupposition requires no substantive accommodative adjustment at all. At most, the addressee accommodates the speaker in the procedural, psychologistic sense of deigning to be reminded of the extant substantive commitment. Case (A) is essentially anaphoric.

In case (B),  $\Theta$  is as non-impositive as a request to continue doing what-

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<sup>27</sup>Imagine once more someone asking you to step aside for a moment. (They are pushing a trolley down the narrow passage you are standing in.) Here you accommodate them if you go along with their request. The move was no trouble at all to you, no skin off your back. Next imagine them asking you to stand on your right leg only. If you went along with this without being given good reasons for doing so, you would already be humouring them.

<sup>28</sup>The memorable scene in a German movie from the 1980s has a candidate for an executive position being asked kindly to stand here, to stand there, and finally to get up onto the tabletop.

<sup>29</sup>This was non-analytic when *pacta* were, as they could be, informal contractual arrangements short of signed and sealed treaties. Even a *pactum* should be honoured.

ever you want to do.<sup>30</sup> In a purely procedural sense, however, such a request is as impositive as could be, for you cannot possibly fail to comply with it. The imposer's rights of imposition are absolute precisely to the extent that the would-be imposition is, in fact, absolutely non-impositive. We see in action here a conservation law in the pico-political economy of granting and justification.

In case (C), which subsumes (B) as a degenerate special case,  $\Theta$  might yet be highly impositive in fact, though masquerading successfully as being non-impositive, or as a mere reminder, or as a combination of the two. There are also intermediates of actual or perceived non-impositiveness. The most important of these, and perhaps the least widely appreciated, hinges on the concept of an *issue*, defined in such a way<sup>31</sup> as to lead straight to the heart of a decision-theoretic semantics. (See Section 2).

This intermediate property is non-impositiveness in virtue of *irrelevance* of the constraint imposed *to the current main issue* (see Merin 1999: Def. 14). In turn, a generalization of this property is *non-positive relevance to that potential outcome of the issue which is dispreferred, for whatever reasons, by the accommodator* (cf. Merin 1997a). Both irrelevance and its generalization will turn out to be of considerable importance for our analysis.

Case (B) is not the only degenerate special case of (C); case (A), we said, is another. It involves a prior addressee commitment or joint commitment which, however impositive it may have been in the past, has already been imposed. It is no longer an imposition now, i.e. something yet to be imposed, which is what an assertion *is*.

Case (C) involves accommodation proper, save in the degenerate cases (A) and (B). (A) and (B) are special, degenerate cases of (C) under either formulation of the latter's non-impositiveness constraint. We can see each of (A) and (B) as an instance of *accommodation of degree zero*, to coin a term.

The question arises whether we should introduce such a term. What speaks for doing so is that null-items, initially introduced for purposes of algebraic closure, are denizens of the formal ontologies discovered or constructed by mathematicians. The empty set, the identity permutation and, more specifically, additive zero are familiar instances. By their precedent, we are sheltered from the force of *entia non sunt multiplicanda*.<sup>32</sup>

However, one may feel that there is a deep qualitative difference between

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<sup>30</sup>Forgetting about whatever further inferences such a strange request would trigger if made vocally.

<sup>31</sup>The full-blooded, natural way; not just in a purely doxastic way of some question-partition being, somehow, given.

<sup>32</sup>And we do not call on zero *praeter utilitatem*.

each of (A) and (B), on the one hand, and non-degenerate cases of (C) on the other. These are the cases which are more or less traditionally treated as instances of accommodation or pragmatic presupposition.

My response to the feeling is to dismiss it as a product of illusion. First, consider the temporal extent or lifetime of potential antecedents for anaphora. We cannot, in general, specify a minimal stretch of time reaching into the actual discourse past beyond which an occurrent potential antecedent loses its anaphoric potential. So, unless we can confine long distance anaphora to the single sentence, (A) will be a matter of degree. But so will (B), in its own way. Some tautologies are more obviously tautologies than others. But again, there is no principled epistemic threshold of recognition. There is at best an empirical statistical generalization. So we do not lose anything but fool's gold in giving up the presumed taxonomic gold standard.

But what do we gain? — As we shall see formally in Section 8, cases (A) and (B) make the prepositum irrelevant to all propositions at the current context, call it  $j$ . Case (B) does so even in counterfactual contexts, provided they preserve our logic. Case (C), in its first, more specific form, merely requires irrelevance, at  $j$ , to the complementary pair of propositions that ostensibly really matter at  $j$ , i.e. the two possible outcomes of the issue.<sup>33</sup> It is this clear and present irrelevance to the main issue which legitimizes the waiver of a right to demand evidential backing (or, in the case of imperatives, material incentives). It is this waiver which, more obviously yet than the relevance relation, distinguishes presuppositions from assertions.

The systematic association of past acceptance and present irrelevance, in the technical sense of current evidential irrelevance, largely explains, I believe, the temptation to see instances of presuppositional accommodation as instances of virtual anaphoricity.<sup>34</sup> In many such cases, say, when a general or possessive definite description is being used (in dialogue among strangers) without an overt discourse antecedent, there is no objective fact of the matter to decide the issue.

Occam's Razor would cut the way of those who intuit no tacit prior mention and will therefore be treating the description as deictic.<sup>35</sup> Nonetheless,

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<sup>33</sup>We are assuming a dichotomous issue. See Merin (1999:Sec. VII) for a relatively deep reason.

<sup>34</sup>In Section 5 we shall see another reason: preservation of update monotonicity.

<sup>35</sup>If we admit *Deixis am Phantasma* (Bühler 1934), we are in the general domain of discourse representation theories, and the difference to virtual anaphora becomes moot. But even though there is then no fact of the matter (as there is none with any irreducibly metaphysical or occult assumption), there remains a practical influence on explanatory inclination. We will see below that, for a certain class of probabilistic presuppositions of Wh-questions which I propose to call 'prejudices', a doctrine of virtual anaphora would dispose us to disregard a much better, epistemic explanation.

a friend of the clean cut might yet accommodate the proponent of universal anaphora. The condition for doing so freely is indeed the condition which I take to be the principal feature of bona fide presuppositional accommodata: that the accommodation is harmless. This is what irrelevance to the issue—irrelevance to what matters at the current context of interaction—means.

But of course presuppositions are not always harmless. As soon as children discover the world of make-believe, their verbal conduct becomes part of a language game of ostense and ostensibilia, and it remains potentially so for the rest of a person's life.<sup>36</sup> We can see this in the way polite society handles the communication of facts that are really most important, but which also happen to be hemmed in by taboos that make them dangerous and which perhaps even lend them their importance in the first place. It is standard practice among urbane conversationists to introduce a fact of that kind as an ostensibly uncontroversial presupposition. The civil, occasionally tactful response is to go along with the presupposition. In doing so, the addressee acknowledges that the matter is 'not an issue', as the semi-idiom puts it.

In this kind of situation, the addressee is fully aware of what might matter and what not. Moreover, an addressee who does, in fact, harbour strong feelings about the putative non-issue, but decides to have them stay put on the back porch, truly accommodates the speaker, and sometimes with the speaker's knowledge.<sup>37</sup>

A similar exploitation of the civil response are formulaic statements in question form such as '*May I remind you that your bill is overdue?*' or formulaic refusals to budge '*We regret that our hands are tied*'. It takes a fair degree of *sang-froid* to answer the first with an absentminded air, '*So you may, so you may!*'. In return, it usually takes more than a bit of credulousness to take for granted that the speaker of the second formulaic utterance is anything but *unwilling* to budge. Formulaic presuppositions are well recognized as assertions, even if at some level of ostensibility they are presented as not being assertions.

Now, whether or not Lewis's label is being used, the presuppositions most familiar in linguistics and philosophy of language are usually characterized as instances of accommodation. They are, by nearly common consent, 'pragmatic presuppositions' and Stalnaker (1970, 1974), who introduced the

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<sup>36</sup>Much as adult knowledge becomes—and stays—true, reliably warranted belief; though see Williamson (2000), who begs to differ and appeals to the 'externalist' doctrine that the contents of our propositional attitudes are not determined mind-internally.

<sup>37</sup>Examples of this kind are perhaps yet more instructive about the nature of accommodation than, for instance, the scenario of two wits who connive to pretend to one another that 'the loyalty examiner' designates an office with a real incumbent (Grice 1989).

term indeed characterized them as instances of the addressee ‘going along’ with the speaker.<sup>38</sup> The description is natural in cases where addressees know what they are going along with. It is natural when going along is either truly no inconvenience, or else when addressees have at least a free choice not to go along.

Ducrot (1968a,b, 1969, 1972), by contrast, emphasized the procedurally impositive nature of presupposition. The speaker who presupposes something is presuming a right to have the addressee go along with him. To challenge a presupposition thus made, is an act of rudeness. The challenge is apt to elicit violent reactions, in a way that the challenge to a putative assertion is not.

So, if we take Ducrot’s phenomenology as seriously as we ought to, we see that there is a high cost to not going along. Sometimes the perceived cost—and it is perceived costs alone that influence real decisions—is so high that an addressee will tag along even though quietly fuming at having to do so, all things considered. In cases that belong to the other extreme of the spectrum, an addressee may well be poorly informed about the consequences and relevances of an accommodatum. This affliction becomes severely pertinent if the speaker is not so afflicted to a like degree. As Ducrot (1969:[30]) put the matter,

If one tries to define presupposition, a phenomenon which does not ... answer to any demand of logical necessity [sc. is pragmatic], one is led to highlight the possibility which it affords for imprisoning the hearer in an intellectual universe which is not of his own choosing, but which is being presented as co-extensive with the very dialogue so far, and which cannot be denied or questioned without rejecting the whole dialogue *en bloc*. If what is presupposed, unlike that which is understood/implicated is not a rhetorical fact, linked to the act of utterance, but rather if it is inscribed in the language itself, one must conclude that

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<sup>38</sup>This is what makes Stalnaker’s ‘pragmatic presuppositions’ accommodable. If we subsume the special, degenerate case under the taxon, they are coextensive with the genus ‘presupposition’. At the time, pragmatic presuppositions, were presented in contrast to ‘semantic’ presuppositions, which were defined as necessary conditions on the truth-valuability of sentences. Yet in a ‘dynamic’ semantics (e.g. Heim 1982, Groenendijk & Stokhof 1990), phrasal expressions semantically denote epistemic context-change functions and presuppositions are defined as definedness conditions on these functions. Geurts (1999) points out that this makes all presuppositions semantic presuppositions, as Link (1986) had pointed out from an inverse perspective. Link’s logicist re-analysis of dynamic approaches to presuppositions, based on the three-valued logic of Blau (1978), is informed by the origins of such logics in the theory of recursive functions, of which update functions can aspire to be special cases.



language, quite independently of the various uses to which it can be put, presents itself fundamentally as a locus of debate and of a confrontation of subjectivities.

However genteel the conclusion, talk of imprisonment is not for the faint-hearted. Perhaps it is even less so for practitioners of the smoother conversational art who feel, deep down, that trade secrets ought to be well kept—out of sight, even their own (albeit last and least). But of course, everything that is being presupposed rather than asserted may be perfectly warranted and true, just as that which is asserted may or may not be so. What is distinctive of presuppositions in moral terms is simply the higher potential for abuse. Assertions give formal notice that a commitment or the lack thereof is to be renegotiated. Presuppositions do not, because they present their contents as having already been agreed upon. Indeed, we shall see that often in enough they present this commitment as having been ratified by the speaker in response to the addressee's own epistemic demand.

Pragmatic presuppositions, we sum up, are attempts by a speaker to impose intersubjective constraints  $\Theta$  on commitments which are to be shared by all parties to the discourse. Unlike in the case of assertions, the attempt is made in a way which presumes that  $\Theta$  need not even in principle be argued for. In explicating the intuitive uncontroversiality requirement on presuppositions by irrelevance to the issue or indeed non-positive relevance to a certain one of its outcomes, we have proposed a constraint whose satisfaction is required for such dispensation to be rationally warranted. The constraint, as I will argue, informs the conduct of everyday discourse. Its status will thus be that of an *a priori* of conversation. But, thereby, it will be a kind of presupposition, and it is to the general sense of 'presupposition' of which it will be an instance that we must now turn.

The label 'pragmatic' attaches to pragmatic presuppositions historically (i.e. *apud* Stalnaker) because their constitution makes essential reference to speakers' and addressees' beliefs. But presuppositions deserve to be called pragmatic also because their role in discourse—be it dialogic discourse or the quiet virtual monologue of thinking—resembles that of tacit assumptions which inform our most mundane of actions. This praxeological moment was emphasized by R.G. Collingwood (1940), who assimilated presuppositions, at least by tendency, to the realm of extralinguistic dispositions.<sup>39</sup>

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<sup>39</sup>In the chapter 'On Presupposing' to which Ducrot (1968a, 1972:41-46) drew attention and in whose works Collingwood, the Waynflete Professor of Metaphysical Philosophy at Oxford from 1935 to 1941, makes his guest appearance in the post-1940s literature on presupposition. Collingwood did exhibit an occasional animus towards formal logicians of his time (cf. Donagan 1962:56-82), notably so when castigating their alleged inability to appreciate the difference between a sentence and a statement. But some of his other

Every statement (of a proposition), says Collingwood,<sup>40</sup> be it tacit or vocal is made in answer to some (open) question, itself tacit or vocal.<sup>41</sup> The potential answers to questions are propositions, which can be true or false. In turn, every question has a (main) presupposition, which is prior to it in ‘logical’ time, though not necessarily in the ordinary time of events in the world or in introspection. Priority means that a question cannot be meaningfully asked unless its presupposition is deemed satisfied.<sup>42</sup> A relative presupposition, says Collingwood (p. 29), is a presupposition of some question  $Q$  and an answer to some other question  $Q'$ .<sup>43</sup> An absolute presupposition is one which stands “relatively to all questions to which it is related” as a presupposition, never as an answer (p. 31).

Absolute presuppositions are so pervasive in a given culture at a given time that they may well remain unperceived. They are rarely if ever stated.<sup>44</sup>

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main ideas, too, are by now common ground, and others might yet deserve to be.

<sup>40</sup>He often reserves the appellation ‘proposition’ for statements or for propositions which are seriously and non-vacuously proponible. But just as often he lapses in the direction of logicians’ usage. In notes found in his files (op. cit. <sup>2</sup>1998, at p. 424) he settles for ‘content’ as that which is common to ‘proposition’ and ‘supposition’.

<sup>41</sup>We may fail to note this outside the scientific domain. But even when the thought expressible by ‘This is a clothes-line’ enters one’s conscious mind as one sees a piece of string stretched across a ship’s deck, the question ‘What is that thing for?’ must have preceded it. Questions are logically prior to answers, and they are prior to them also in ordinary time when orderly scientific procedure is followed. This view has met objections (Donagan 1962), but it seems consonant with the statistician’s practice. The basic objects of the statistician are random variables (rvs), which are explicata for questions (‘to nature’) *sive* ‘experiments’ (cf. e.g. Blackwell & Girshick 1954:324). It is dependencies among rvs which are the principal objects of lawlike relations.

<sup>42</sup>Collingwood illustrates with a sequel to Eubulides’ ‘Horned Man’ which became the benchmark example of aspectual presupposition: “There is no verbal impossibility in the way of asking a man whom you suppose to be an indulgent husband whether he has stopped beating his wife. But there is a logical impossibility; for that question arises from the presupposition that he has been in the habit of beating her. If he is not supposed to have been in that habit, the question whether he has stopped does not arise.” (p.25f.) Collingwood then claims that the proposition presupposed, even when merely supposed, actually *causes* the question to arise. This is illicit conversion of the first claim. ‘Kim has a sister’ will not invariably raise ‘Is Kim’s sister in Turku?’. Still, many expression types (e.g. ‘Someone walks’, whose instancial ignorance presumption inspires the question ‘Who walks?’) will lend the claim some plausibility.

<sup>43</sup>Example: When measuring, and thus asking Nature ‘What is the distance from  $a$  to  $b$ ?’, I ordinarily presuppose that my tape-measure is correct. But it might stretch over the years, and occasionally I will question its correctness by matching it to an unstretchable surveyor’s chain. — This praxeological example prefigures the popular ‘contextualist’ view of knowledge attribution (cf. Lewis 1979, 1996). As Ducrot (1972) points out, it characterizes presuppositions as preconditions for the success of purposive conduct in a way subsequently generalized by Austin (1962).

<sup>44</sup>They are, we might say, at most being recalled as reminders. If we demand that

Collingwood's first example is 'Everything that happens has a cause' (p.31). This synthetic judgment a priori, as Kant classified it, is absolutely presupposed by the classical working scientist. Though it might be asserted to a layman who asks ill-informed questions, it is not questioned. Above all, it is not supported by further argument. Yet to the average quantum physicist, it will be a presupposition at best relative to the context of classical deterministic systems.

Collingwood's absolute presuppositions aim to capture a historical and thus descriptive notion of metaphysics: the domain of convictions *a priori*. Their full scope need not concern us here.<sup>45</sup> Instead, we head straight for an example which Collingwood himself did not consider and which is as close as we ever get to absolute presuppositions on a season ticket. This is the old and not at all highly regarded notion of 'semantic presupposition' (SP), understood at its least impressive, i.e. within classical, bivalent logic.<sup>46</sup>

SP is conceived of as a property of certain indicative mood sentences. A sentence  $S$  semantically presupposes a sentence  $T$  in language  $L$  semantically characterized by a consequence relation  $\vdash_L$  iff both  $S \vdash_L T$  and  $\neg S \vdash_L T$  are true, i.e. if both  $S$  and its negation  $\neg S$  entail  $T$ . When  $L$  is classical logic, it is easy to see that an  $S$  semantically presupposes  $T$  iff  $T = \Omega$ , the tautology. Moreover, any interrogative sentence  $Q$  in  $L$  has this presupposition, too, whether it be of the form  $S?$  or any other form. If a question denotes a partition (subject to whatever further constraints) of (a subset of) the space of possibilities, then any of its possible answers entails  $\Omega$ .<sup>47</sup>

This finding trivializes the notion of 'semantic presupposition' for biva-

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assertions be supported by proper reasons, reasons other than 'I find this useful to believe', and if we demand that they be relevant to some proposition or other, absolute presuppositions are not asserted at all. They are not even propositions, says Collingwood somewhat confusingly. But when 'proposition' is understood to mean 'assertion' or 'properly assertible proposition' (see note above) the claim follows straightforwardly from the assumption that absolute presuppositions are never answers to questions (p. 32).

<sup>45</sup>Collingwood undertakes to show (pp. 243-275) that Kant's 'Transcendental Analytic' in the First Critique can be read as a history of the absolute presuppositions of natural science from Galileo to Kant's own time (p. 246), few of which survived the 1930s. In the consensual linguistic taxonomy adopted by Kadmon (2001:222) and reported above, we should place most, though not all absolute presuppositions in the residual category (iv). See Appendix 2 for an ethnographic workout.

<sup>46</sup>There is also a more specific notion often referred to as 'semantic presupposition', namely in Frege's (1892) observation that use of a proper name presupposes existence of a referent.

<sup>47</sup>Donagan (1962:74f.) notes that Collingwood excluded self-evidently necessary ('analytic') propositions from the realm of absolute presuppositions. He may de facto have done so, but there is no policy statement and no acknowledgment of a 'synthetic'/'analytic' distinction.

lent logic.<sup>48</sup> In a way it means that nothing is absolutely presupposed. The tautology rules out no possible state of affairs. Dynamically speaking, the tautology is not a proponible because, as we shall explicate, it is irrelevant to any proposition whatever. But this will not mean that nothing whatever is absolutely presupposed. The tautology is the set or representative of the set of all the theorems of our logic. To presuppose these theorems is to presuppose quite a lot, as we realize when considering alternative logics. Presupposing nothing meant presupposing nothing relative to our logic.

Our most absolute presupposition,  $\Omega$ , instantiates the notion of presupposition as a property of epistemic contexts. If our semantics-cum-pragmatics is a conservative extension of classical logic, then the tautology is presupposed at every possible context of use. If we identify a context with a set of sentences or a proposition, one way of putting this is to say that  $\Omega$  is entailed by every context of use.<sup>49</sup> On these grounds,  $\Omega$  is indeed acknowledged in the literature as a universal pragmatic presupposition (Kadmon 2001:119).

Another way of putting the matter is to make explicit the notion of a propositional attitude that constitutes a context. We can do this in a doxastic modal logic by saying that  $S$  is a certainty or that  $S$  is (treated as) known in the context  $j$ . We write  $K(S)$ , short for  $K^j(S)$ , in this case, under familiar interpretations of certainty as doxastic necessity. But we can also formulate the matter in terms of a probability constraint, namely  $P^j(S) = 1$ , which says that the context  $j$  is such that  $S$  is believed there with maximal degree of firmness, namely judgmental probability 1. All familiar modal logics (see e.g. Chellas 1980) of doxastic or epistemic necessity have  $K(\Omega)$  as a theorem, as all familiar abstract modal logics have  $\Box(\Omega)$ , i.e. that  $\Omega$  is necessarily true, as a theorem. And for all probability functions  $P$ ,  $P(\Omega) = 1$  is valid.

In terms of our original problem,  $\Omega$  is the most harmless of pragmatic presuppositions. If it is imposed, it is imposed rightfully because it was indeed already taken for granted. In return, and given our logic, it is not a helpful presupposition. It is in fact wholly non-impositive, which is another way of saying that it is irrelevant to any proposition at any time. Just as statements such as ‘It’s raining or it isn’t raining!’ are caricature reminders of something apparently forgotten,<sup>50</sup> so  $\Omega$  is the caricature of a

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<sup>48</sup>See Beaver (1997:Sec. 2) for a survey of partial, three- and four-valued logics applied to presupposition which aim to de-trivialize the notion.

<sup>49</sup>A context will then simply be an instance of a sentence  $S$ . Think of it as a long conjunction.

<sup>50</sup>The exclamation mark indicates that they are understood as exhortations to stop behaving in a way indistinguishable from the conduct of one who has forgotten the law of excluded middle. Intuitionists will of course treat excluded middle as an assumption

presupposition. It exaggerates features common to all pragmatic presuppositions, omits some of them and adds one of its own. The stark virtues and failings of its exaggerated features make it paradigmatic for a justificational approach to presuppositions, which is the one to be taken here.

Pragmatic presuppositions  $\Theta$  more generally are always presupposed at some context of use  $c$  or other.  $\Theta$  is a pragmatic presupposition of a sentence  $S$  iff it must be entailed by any context  $c$  in which  $S$  can be felicitously used (Karttunen 1971, Stalnaker 1970). This means, logically, that it is (ostensibly) entailed by a non-empty set  $\Sigma$  of premisses which represent or constitute the context.<sup>51</sup>  $\Omega$  is simply that proposition which is entailed even when  $\Sigma$  is the empty set of sentences.<sup>52</sup>

When  $\Theta$  is entailed (or assigned unit doxastic probability) by any  $c$  in which a certain type of sentence  $S'$  can be felicitously uttered, but not by all, it will be of interest to linguists. We have recalled that there are many kinds of such  $\Theta$ , and the criteria for distinguishing them are in the first place phenomenological, and then, with some luck, neatly theoretical.

In Section 7, we distinguish pragmatic presuppositions further, and formally so, into *deterministic* and *probabilistic* presuppositions. The latter are propositions which are themselves constraints on probability functions. The former will constitute the special case in which we can eliminate reference to probabilities from the propositions presupposed.

Here is an instance of an essentially probabilistic presupposition. Recall that Collingwood required of any assertion that it answer an ‘open question’. A presupposition  $\Theta$  was defined to be an entailment of a question  $Q$ , that is, entailed by all possible direct answers to  $Q$ . *The* presupposition of  $Q$ , in this sense, will presumably be the logically strongest such proposition. This idea is now commonly accepted. The denotation of a question  $Q$  is explicated as a partition  $\pi_Q$  of a set  $\mathcal{S}$  of possibilities whose cells are the possible exhaustive answers to  $Q$  (Hamblin 1958).<sup>53</sup> For  $\Theta$  to be other than

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that has to be granted each time afresh or by revocable standing order. Either way, the example shows how problematic H.P. Grice’s (1989) ‘Be informative’ turns out to be as a generator of putative conversational implicature. Stating a tautology neither intimates just any proposition whatever, nor does it reduce us to the circularity of Grice’s advice to infer the meaning of a particular tautology from the speaker’s apparent intentions in uttering it. See Hugly & Sayward (1979) for this observation, which seems to have engendered little discussion.

<sup>51</sup>See Barwise (1999) for the concept of ‘local logics’.

<sup>52</sup>Not, of course, of possible worlds or models verifying them.

<sup>53</sup>This conception faithfully mirrors the concept of an experiment, which, remember, is also known as a ‘question to nature’ (most often so in the popular literature on information theory). A direct answer eliminates at least one cell of  $\pi_Q$ . ‘I don’t know!’ is not therefore a direct answer, nor are statements which are indirect answers in the sense of being relevant to at least a pair of cells of  $\pi_Q$  without eliminating any cell (Merin

the tautology,  $\Omega$ , the question  $Q$  must exclude some possibilities outright and  $\mathcal{S} \neq \Omega$  must hold. Conceived of as a proposition,  $\mathcal{S}$ , i.e.  $\cup \pi(Q)$ , is the presupposition,  $\pi(Q)$ , of  $Q$  and it has sometimes been identified with the (semantic) meaning of  $Q$ . The reason was presumably that it is simply a proposition like any other and can thus be true or false. But attention to the actual everyday meaning of the predicate ‘true question’ already suggests why this move was misguided. A true question is one whose answer is not already common ground. A true question is an open question.

When we speak of an *issue*, we are speaking of the denotatum of an open question  $Q$  (here we suppose for didactic reasons that the issue is not practically ineffable) to the adoption as common ground of whose possible answers distinctive interests attach, either directly or derivatively (Merin 1999: Def. 6). Besides any propositions  $\Theta$  entailed by all answers to  $Q$  we must then consider further presuppositions:

- (A) that the question is still open and
- (B) that actually or virtually divergent interests attach to it.

In what follows, we attend formally to (A), having considered (B) informally already.

Now, (A) is not, in the erotetic logicians’ sense, a presupposition of  $Q$ . If  $Q$  has been answered, that presupposition,  $\Theta$ , persists, as it does for Collingwood. After all, it is defined as being the logically strongest proposition entailed by each of the possible answers to  $Q$ . However, when we admit as presupposita propositions which contain modal or probability terms, we can define openness of  $Q$  and can thus define the context-relative semantic meaning of a question—semantic in so far as we shall make no appeal to pragmatic properties such as an addressee obligation to answer.

Suppose that our doxastic state is given as an infinite set, notated  $\{(\mathcal{F}, P)\}$ , of probability spaces of whom  $(\mathcal{F}, P)$  is a representative element. Here  $\mathcal{F}$  is a boolean algebra (of propositions) and  $P$  a probability function defined on it (see Appendix 1 for definitions and axioms).<sup>54</sup> Then a question  $Q$  which would carry no deterministic presuppositions relative to our probability space would be a pair  $(\pi, \{P\})$  of a partition  $\pi$  of  $\cup \mathcal{F}$  whose cells are elements of  $\mathcal{F}$  and of an infinite set, notated  $\{P\}$ , of probability distributions over  $\pi$ . The minimal constraint for an open question is that

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1999:196n30). Relevance is explicated in Section 2, below.

<sup>54</sup>Why an infinite set of probability spaces? Because a context is given by probability constraints, i.e. sets of equations and inequations. These need not determine a unique, point-valued probability value for each element of  $\mathcal{F}$ . Jeffrey (1992) refers to such sets of point-valued probability functions on a given algebra as ‘probasitions’, in analogy to sets of possible worlds.

$P(A_i) < 1$  holds for each cell  $A_i$  of  $\pi$ . This is what corresponds to the modal constraint  $\neg K(A_i)$  for all  $A_i$ . When  $Q$  carries a deterministic presupposition  $\Theta$ ,  $\pi$  is a partition of  $(\bigcup \mathcal{F}) \cap \Theta$ .

An open question  $Q$  presupposes its deterministic presupposition  $\pi(Q)$ . But it cannot presuppose any one (or any subset) of its possible answers  $A_i$ . More strongly yet, it could not be an open question in context  $j$  if any of its answers were already a certainty at  $j$ .

Stalnaker (1974:208) remarked, tersely,<sup>55</sup> that a supposition such as expressed by the antecedent  $A$  of a conditional indicates that  $A$  is not a presupposition. To suppose any proposition  $S$  is to indicate that one does not know whether  $S$  and that, hence,  $S$  is not common knowledge.<sup>56</sup>

As Beaver (1997) implies, this idea is central to an approach to a problem which we have so far barely mentioned: the projection problem (see Section 12 below and Appendix 2). This is the problem of how the apparent presuppositions of simple sentences fare when these sentences become part of complex sentences. Gazdar (1979) gives an account which suspends (cancels, filters) such presuppositions of simples in certain environments. His suspension scheme amounts to an extension of Stalnaker's observation to both clauses of a conditional and to the statement of disjunctions. This is the centrepiece of his theory of presupposition projection. But the underlying ideology is subtly different.

Gazdar represents the hardline logical positivist approach to presupposition. What we can see, he says, are certain kinds of clause tokens which would trigger presuppositions if left to their own devices. In certain environments, these presuppositions fail to be intuitable. We cannot assume that prior context entails the presuppositions, for if it did there would be no need to carry them.<sup>57</sup> All we *can* say is that the prior context must be consistent with these presuppositions. Being entailed by context would be a special case of this condition.

As logical positivism waned to make place for a kindlier attitude to-

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<sup>55</sup>But extracted by Beaver (1997) from a discussion of putative semi-factive verbs where the remarks were casually dropped.

<sup>56</sup>"...if a speaker explicitly supposes something, he thereby indicates that he is not presupposing it, or taking it for granted. So when a speaker says 'if I realize later that  $p$ ', he indicates that he is not presupposing that he will realize later that  $p$ . But if it is an open question for a speaker whether or not he will at some future time have come to realize that  $p$ , he can't be assuming that he already knows that  $p$ . And if he is not assuming that he himself knows that  $p$ , he can't be assuming that  $p$ . Hence,  $p$  cannot be presupposed. A roughly parallel explanation will work for *discover*, but not for *regret*."

<sup>57</sup>"Most of [the various pragmatic definitions of presupposition] stipulate that the presupposition be shared by the addressee. If this is taken seriously, then it rules out any possibility of acceptably communicating new information, however trivial, in presuppositional form." (Gazdar 1979:106)

wards metaphysics and the occult, people were prepared to make allowances. If presupposition-triggering items wanted their presupposition as common ground, accommodation would provide it. For Gazdar, by contrast, accommodation remained an uncanny process.<sup>58</sup> It circumvented, so his most serious charge, any possibility of counterexamples while (and *in*) treating the bulk of ordinary conversation as “something special”. This last point bears expanding.

Whenever accommodation is not degenerate, it involves the pretense—an ‘as if’—that something *was* entailed prior to the current utterance, which had, in actual fact, been inserted into the context only by this very utterance. That virtually all of ordinary discourse should be informed by more or less transparent falsehood (which is what pretense is) ought to be truly shocking to anyone who accepts the truth- or proof-conditional doctrine of semantics. Since it is one or the other of these two doctrines that still informs our best-received theories of meaning somewhere along the line, we are faced with a serious philosophical problem.

Gazdar’s remedy was to substitute for Stalnaker’s requirement that presuppositions be entailed by the context a weaker requirement, namely that they be consistent with the context. Provided one could circumscribe the kinds of expressions which can project potential presuppositions, this would not open the floodgates to anything under the sun being presupposed, while avoiding the spurious safety of entailment.

Prevailing doctrine took no heed of Gazdar’s scruples and I agree that the diagnosis of systematic pretense cannot be avoided. Part of our task will, accordingly, be to give a proper analysis of the framework which makes it possible and, in Section 5, I will to such ends introduce a distinction between ‘causal time’ and ‘evidential time’. However, the shock value which the possibility of systematic pretense harbours, ought not to be forgotten. I will try to take account of it in specifying conditions under which things may, it seems, be taken for granted. But we should also ask, and right away, what ideological price was being paid for comfort. That comfort was the license to remain unruffled by the abuse of pico-historical truth—truth about the conversational record—which Gazdar found too shocking to impute to competent language users as a constitutive and systematic practice.

The price, I believe, was to accept a doctrine of communication for which a game of pure coordination was paradigmatic. This doctrine had *de facto* been promoted by Grice (1989) in his 1967/68 Harvard Lectures, and it was

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<sup>58</sup>And not only because it had not yet acquired its name. “Stalnaker’s strategy (1974:202-203) is to say that speakers PRETEND that their addressee already knows about his presuppositions and that parties to the conversation conspire together to behave AS IF everyone already assumes what has been presupposed.” (loc.cit.)



given a formal underpinning with a name to it by Lewis (1969). The relationship would be this. If a basic structure of non-conflicting common interests could be presumed, then the pretense which underlies accommodation had the status of an untruth, but not that of a lie.

For a false assertion to be a lie, it must ordinarily be made in unilateral awareness of its falsity, and acceptance of the proposition asserted must be detrimental to the interests of someone, in general someone other than the assertor. The Grice/Stalnaker doctrine of mutual connivance removes both these conditions.<sup>59</sup>

Ducrot's polemic approach diverged from this tranquil view of communication. It denied the basic common interest structure, even if it did recognize some, though not complete, mutual awareness of pretense. At any rate, if we take his idea as seriously as we ought to take Gazdar's worries about a metaphysics of communicative conduct being predicated on sheer pretense, the problem of characterizing accommodables in some predictive way becomes all the more pressing.

In logical terms, the site of explanatory action will presumably be the space between epistemic necessity, i.e. entailment by the context (Stalnaker, Karttunen), and the implicit epistemic possibility of consistency with this context (Gazdar). Probability theory, as Wittgenstein (1922:4.464) darkly noted, grades the space of possibility between necessity and impossibility. Give or take some measure-theoretic niceties,<sup>60</sup> necessity means probability 1, and possibility means non-zero probability. Our task will be to make use of doxastic relations which cannot be defined solely in terms of these two conditions on probabilities.

That probabilities may have something to do with accommodation does not come wholly unexpected. It is linguistic folklore that stereotypic assumptions make good accommodata, accommodata which do not raise eyebrows from an addressee who is faced with having to go along with them. When someone tells you *My dog is at the door*, you accommodate them in letting them take for granted as mutual knowledge the proposition that they have a dog (Kadmon 2001:18). You will accommodate them if—and

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<sup>59</sup>But, unless we transcendentalize the set of participants to the whole community of sentient beings, it is still compatible with a communicative paradigm of two ironists conspiring against a real or playfully virtual third party. Recall once more Grice's (1989) story of two such wits pretending, transparently to one another, that "the loyalty examiner" designates an office with an incumbent. Conditions for the possibility of irony were period-bound for this example, and perhaps the brief liberal upsurge that characterized the decade 1960-1970 in most walks of life made the coordination game paradigm seem entirely natural among people of a well-meaning disposition.

<sup>60</sup>Whose importance in classical real analysis is only matched by their recalcitrance to imaging by naive intuition.

even if—you had no reason to believe that they kept a dog.<sup>61</sup> By contrast, if they tell you *My giraffe is at the door*, you will most likely be reluctant to accommodate the analogous presupposition (op.cit. p. 20).

In a probabilistic framework we should say that your real, low prior probability for your interlocutor keeping a giraffe at the ready, which is informed by informal statistics, requires some real evidence to be raised to a level from where it could license acquiescence in its being given unit probability in the context.

But note also a factor which played no role in the pet story reported by Kadmon. Suppose you and your interlocutor stand in the relation of extortionist to prospective extortionee (never mind who is which). Then your interlocutor's presupposition of dog-ownership becomes highly pertinent to the generic issue between the two of you. If someone doesn't keep a dog, it can't be at the door. And lest one think that only presence at the door matters, imagine your opposite number telling you with an angelic smile, not overdone: *My dog isn't at the door*. If you believe these ostensible words of reassurance, you may have as much cause to worry, perhaps even more so, than in the first case. But in either case, which is a case where something hinges on the matter of dog possession, you would have to be very impressionable indeed to accommodate possession of a dog. A tacit request to accommodate possession of a giraffe might seem comparatively harmless in such a situation,<sup>62</sup> because giraffes are not weapons of highly personal destruction and because, right then, you have more important things to care about than a piece of the abstract truth.

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<sup>61</sup>You might feel uncomfortable, for purely aesthetic reasons, on realizing that you are talking to a personality who keeps a dog. But this will not presumably affect your willingness to accept the veracity of the intimated presupposition that they have a dog.

<sup>62</sup>We ignore inferences about actual or tactically feigned mental imbalance as well as speculations which are not predicated on the pacific giraffe stereotype.

## 2. Expectation, Preferential and Evidential Relevance

‘Decision theory’ refers to a family of theories of suitably coherent beliefs, represented in judgmental probability, and of preferences. For the purposes of decision-maker’s evaluation, it treats actions as random variables. These are functions from contingencies to sets of values, with a probability distribution or density defined over the inverse images of the values.

When the values are numerical, as they are usually assumed to be, a discrete random variable  $X$  has an expectation,  $E(X)$ : the sum  $\sum_i P(X^{-1}(x_i)) \cdot x_i$  of the possible values  $x_i$  of  $X$ , weighted by the probabilities  $P(X^{-1}(x_i))$  of the respective cells  $X^{-1}(x_i)$  of contingencies that are each associated with a value.<sup>63</sup> The principal principle of decision-theoretic praxeology is to choose that action which has maximal expectation.

In an assertoric context, the *relevance* of a proposition with respect to a context of belief and valuation might thus be defined as the *change in the expectation* of a suitable random variable expressing such valuations which is brought about by that proposition  $A$  becoming accepted or having its probability changed (Jeffrey 1965). In other words, relevance will be a function of a difference  $E(X|A) - E(X)$  or quotient  $E(X|A)/E(X)$  of conditional and unconditional expectations. (If you like extremes, you might define relevance also as the quotient  $E(X|A)/E(X|\neg A)$  or difference  $E(X|A) - E(X|\neg A)$ .) The meaning of a proposition  $A$  will thus be defined at its most extensive—and not always most usefully—by the relevance relations which it enters into with all possible random variables  $X$  that represent quantities of human interest. One task of the meaning theorist will be to investigate how broadly or narrowly such relations will have to be considered to capture useful generalizations.

When the random variable  $X$  is of a general kind, and such that its values may be interpreted as utilities or desirabilities, we might speak of *preferential relevance* or *valuational relevance*.<sup>64</sup> Example: A certain community Alpha, defined amongst other things by the right-minded personal and moral preferences and elastic supply schedules of its members, comes to believe that consuming Brand Beta enhances personal attractiveness or that liberating community Gamma decreases the amount of evil in the world. Assuming that people, as common sense so confidently puts it, tend to act on their beliefs, expected benefits of those with a stake in consumption of Beta

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<sup>63</sup> $X^{-1}$  is the function that maps each value of  $X$  to the set (equivalence class) of arguments for which  $X$  takes that value. The equivalence classes form a partition of the set of all arguments of  $X$  and are by definition probability-measurable sets, e.g. propositions. (Reminder: probability axioms are stated in Appendix 1.)

<sup>64</sup>I have proposed the term ‘relevance<sub>*u*</sub>’, where *u* is mnemonic for ‘utility’, i.e. a numerical representation of strength of preference or dispreference.

or in the liberation of Gamma will increase. Here, preferential relevance is defined with respect to particular acts, i.e. purchasing plentiful amounts of Beta or supporting the liberation of Gamma by any means necessary. The framework generalizes easily to examples that involve the passing of exams and a night out at the movies.<sup>65</sup>

Preferential relevance is to be distinguished from a special case of relevance familiarly known as *evidential relevance*. The latter is defined entirely in terms of relations among probabilities (see Section 6, below).<sup>66</sup> Briefly, evidential relevance of a proposition  $A$  to a proposition  $H$  is positive, negative, or zero depending on whether the assumption of  $A$  (without further new assumptions being made) will raise, lower, or leave unchanged the probability of  $H$ .

Probability is a special case of expectation, namely the expectation of 0-1-valued, indicator random variables. Let  $X_A$  take the value 1 for argument  $\omega$  iff  $\omega \in A$ , else value 0. Then  $E(X_A) = 1 \cdot P(A) + 0 \cdot P(\neg A) = P(A)$ . An axiomatic definition of probability entirely in terms of the expectation operator, i.e. without mention of probabilities, is routinely feasible.

Indicator rvs are also known as ‘Bernoulli’ variables. Shorn of their attached probability distribution, they are known as ‘indicator functions’, and, outside probability theory, as ‘characteristic functions’ of sets. When the sets are sets of possible worlds or of models standing in for aspects of worlds, indicator functions represent propositions as commonly construed.

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<sup>65</sup>One might, of course, also define a notion of preferential relevance for questions. The obvious candidate for this appellation is familiar from the literature on the design of experiments. Stated in ordinal terms, a question may be more or less relevant relative to a decision problem depending on how far an answer to it that one can act upon will reduce the expected loss (increase the expected gain) attendant upon the decision. For a brief outline of basic decision theory in such a context, see also Merin (1994b), pp. 148-158.

<sup>66</sup>Dub it ‘relevance<sub>e</sub>’. For a routine definition of purely evidential relevance of answers to questions and of questions to other questions, see Merin (1999:196n30). For a proof that the Johnson-Keynes relevance function  $\text{rel}k_H^i(A) =_{df} P^i(AH)/[P^i(A)P^i(H)]$  is a utility in the strict sense of Jeffrey (1965), see Merin (1997b:23), and for more context for the result, Merin (1999:192n18, and thereabouts).

### 3. Pragmatics and Semantics

In what follows we restrict our attention to the purely doxastic fragment of a Decision-Theoretic Semantics [DTS] (see Merin 1999). This means that we consider in a formal way only constraints that can be stated exclusively in terms of probability spaces. This policy decision, which has for background the familiar dissociation of evidential and preferential aspects of decision-making in decision theory, has a tangible scientific payoff. When we restrict ourselves to the probabilistic fragment, we have much sharper constraints to work with. There are fewer degrees of freedom to contend with than in the case where utilities are formally taken into consideration as well. In the latter case, we are, accordingly, in danger of delivering, as explanations in the analysis of language phenomena, laboured paraphrases of what is already obvious to unaided common sense.

Focussing our attention on a single issue-partition  $\{H, \neg H\}$  to which preferences attach in a purely qualitative way (for or against; i.e. the ‘nominal’ concept type of Carnap 1950), we are screening our inductive semantics of evidential relevance from utility considerations.<sup>67</sup> Such focussing of attention also seems to inform our everyday reflective intuitions on argument. It is a sign of intellectual maturity to be able to treat questions of evidential cogency in isolation from those of preference.<sup>68</sup> (And it is a sign of intellectual immaturity to overlook when the time has come for the two to be brought back together.)

As a taxonomic suggestion we might thus adapt the well-known saying of Gerald Gazdar’s to present concerns: Indexical kinematic semantics = Pragmatics minus Utilities. Pragmatics of language will be taken to be the study of phenomena (or their description in terms) that involve relations among general, non-indicator type random variables. Context-dependent, indexical semantics will involve relations among indicator random variables only.<sup>69</sup> Deductive indexical semantics will be the restriction to relations of extreme evidential relevance (Carnap 1950), i.e. to non-vacuous and relevant entailment relations  $X \vDash_i Y$  defined to hold iff  $P^i(Y) < P^i(Y|X) = 1$ .

I speak of *i-entailment* of  $y$  by  $X$ , (abbreviated:  $X \vDash_i Y$ ) when  $P^i(Y|X) = 1$ . By this I therefore mean what is technically known in boolean

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<sup>67</sup>As a quantitative condition we might require that utility-valued rvs attaching to the issue  $\{H, \neg H\}$  exhibit reasonably high variance, i.e. large differences between the two possible outcome values.

<sup>68</sup>Ramsey’s (1926) simultaneous elicitation paradigm for degrees of preference and of conviction is a rational reconstruction of this ability.

<sup>69</sup>I cut some corners here: lexical semantics surely does involve references to non-indicator variables. So take the taxonomic suggestion, not as a piece of would-be legislation, but rather as a heuristic pointer to some useful principles of descriptive abstraction.

set algebras as set-inclusion  $X \subseteq Y$  ‘modulo zero-sets’, i.e. disregarding any sets  $X \cap \neg Y$  of  $P^i$ -measure zero. Since  $P(\emptyset) = 0$  for any measure  $P$ , and since  $P(Y|X)$  is undefined when  $P(X) = 0$ ,  $i$ -entailment rules out vacuous entailment by *ex falso quodlibet* but does not yet rule out vacuous entailment by *verum ex quodlibet*  $X \models_i Y$  where  $Y = \Omega$  and, more generally, where  $P^i(Y) = 1$ . However,  $X \varrho \models_i Y$ , i.e. *relevant  $i$ -entailment*—call it  *$\varrho i$ -entailment* or, briefly,  *$\varrho$ -entailment*—does rule out this degenerate case. Finally, to model proper  $i$ -entailment or proper  $\varrho i$ -entailment, we want the additional condition  $P^i(X) < P^i(Y)$ . Perhaps  $X \pi \models_i Y$  and  $X \frac{\varrho}{\pi} \models_i Y$  might be symbols for heavy usage, if none better are found or needed. At any rate, my feeling is that the psychologically prototypical case of entailment is proper, relevant entailment or  $i$ -entailment, i.e.  $X \frac{\varrho}{\pi} \models_i Y$ .

In each case, inductive and deductive, suitable quantification over  $i$  will give us transcontextual semantic relations, even classical entailment,  $\models$ , give or take a convention about *ex falso quodlibet*.

In what follows we proceed mainly in propositional terms, i.e. we treat our  $X$ ,  $Y$ ,  $A$ , and  $B$  as atomic. However, I do believe that the dark notion of ‘salience’ (of possible referents etc.), which plays a prominent role in the pragmatics of properly sub-sentential analyses, is at least in some parts amenable to a like analysis (see Merin 1999:209-214 on ‘also’).

#### 4. Assertoric Updates of the Common Prior in a DTS

In a DTS, assertions are treated as intended Bayesian updates. In the simplest of terms, an assertion of a proposition  $E$  has the intended effect of conditioning an ostensible Common Prior probability function [CPr], write it  $P^j$ , on  $E$  to yield a Common Posterior [CPo],  $P^{j+1}$ .

The symbols  $P^j$  and  $P^{j+1}$  each stand for any representative of a set of probability functions solving a set of probability (in)equations. However, for simplicity's sake and without loss of generality, we proceed in terms of representatives. Conditioning on  $E$  implies, for one, that  $P^{j+1}(E) = 1$ . Example: At context  $j$  speaker  $\sigma$  asserts

- (1) Kim walks.

If the assertion is accepted tacitly or vocally by the addressee, the context  $j$  changes to a context  $j+1$  such that 'Kim walks' is assigned unit probability by the probability function(s)  $P^{j+1}$ . Conditioning  $P^j$  on  $E$  means, more particularly, that for any proposition  $X$  in  $\mathcal{F}$ ,  $P^{j+1}(X) = P^j(X \cap E) / P^j(E)$ . The latter quotient, which defines the conditional probability of  $X$  given  $E$ , is usually notated  $P^j(X|E)$ . It is defined whenever  $P^j(E) > 0$  holds.<sup>70</sup> We can thus write:  $P^{j+1} = P^{j+1}(\cdot) = P^j(\cdot|E)$ . Clearly,  $P^j(E|E) = 1$

The assertion also conditions CPr on the proposition, write it  $p^s(E) = 1$ , that the assertor  $s$  be certain of  $E$ . One way to conceive of this process is to have the assertor's probability for  $E$  reflected in CPo. Thus, put at its most sparsely, the principle followed will be  $P^{j+1}(E|p^s(E) = 1) = 1$ .<sup>71</sup> This well-known principle of 'reflection'<sup>72</sup> offers a way to represent the commonsense idea that  $E$  becomes common belief because the assertor already believes it and is deemed to be authoritative on the matter. It is this presumed authority to command assent which, I take it, explicates the concept of knowledge independently of the concept of 'reliable justification'. Each of the two explications of knowledge has its merits and problems. The present one seems most apt for a predictive theory of meaning. (In Section 7, we shall look at one of its logical reflexes in the 'T'-axiom of epistemic modal logic.)

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<sup>70</sup>Thus, when  $P^j(E) = 0$ , i.e. when  $P^j(\neg E) = 1$ , we cannot condition  $j$  on  $E$ .

<sup>71</sup>An account less sparse, and with more references to the philosophical literature, is in Merin (2002a). The formula is a special case of the more general constraint form  $P^{j+1}(E|(p^s(E) \in [\alpha, \beta]) \wedge D) \in [\alpha, \beta]$  for any background condition  $D$  such that  $P^{j+1}((p^s(E) \in [\alpha, \beta]) \wedge D) > 0$ ;  $[\alpha, \beta]$  a sub-interval of  $[0, 1]$ .

<sup>72</sup>So dubbed by van Fraassen (1984) in the context of intra-personal decisionmaking involving stages of the same individual. My adaption to interpersonal belief transmission follows Gaifman's (1988) transfer of this notion to adoption of expert beliefs. Speaker  $s$ , in making an assertion, is claiming expert status.

We write CP when referring indifferently to both of CPr and CPo. The CP is a probabilistic explication of a joint epistemic commitment state. Updating CPr to a CPo is subject to tacit or vocal ratification by the addressee. A denial will thus, amongst other things, represent a refusal to ratify the update (Merin 1994a).

Common Ground [CG], as familiar from H.P. Grice and R.C. Stalnaker, is then identified with the set of propositions that receive unit probability in CP. I.e., we say proposition  $A$  is (context)-presupposed at  $j$  iff  $P^j(A) = 1$ .<sup>73</sup>

Denial of a proposition  $E$  at  $j$ , as far as the resultant target context  $j + 1$  is concerned, is equivalent to assertion of  $\neg E$ . If it is ratified,  $j + 1$  will satisfy the constraint  $P^{j+1}(\neg E) = 1$ , which is equivalent to  $P^{j+1}(E) = 0$ .

Assertions and denials both take effect (if ratified) at a context which is intuitively subsequent to the context of utterance. In the case of accommodation, this order of things is subverted (recall the discussion in Section 1). The larger world of historical events is replete with instances of this. Laws are frequently promulgated to take effect retroactively. Sometimes they are even pre-dated so as to have been deemed to have been promulgated at a date earlier than the actual date of communication or drafting (see Merin, in press).

Similar processes attend the historical record, recorded with an eye to history. The historian's task in doing *Quellenkritik*, i.e. 'critical examination of sources' is, among other things, to spot documents and record entries which purport to be from a certain date but which have, in fact, been physically produced at a later date.

Predatings are frequent and perfectly reasonable procedure when they offend the interests of no-one. An example is a predated employment contract. There might be some accidental hold-up; funding is not yet secured, but is almost surely forthcoming. Work begins on the basis of this expectation and the contract is signed, predated, when funds come through. However, and particularly in the world of legislation, there are also scenarios of harmful predatings. This danger is countered by the requirement of promulgation in the public domain, and any legal system worth its name has constraints against retroaction which ought to be difficult to undo.

Either way, for good or for ill, human beings are capable not just of making history, but also of making it up; and of making history in making it up. In the next section, we propose a very general conceptual framework for representing this capacity in the pico-historical domain of assertoric discourse.

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<sup>73</sup>See Merin (1997a) and below for some traditional presuppositions treated in this framework, and Merin (1999) for more of them.



## 5. Evidential Time and Causal Time

We distinguish *evidential time*,  $t_e$  (e-time) and *causal time* time  $t_c$  (c-time) to establish a reasonably general framework for assertion, presupposition, and presupposition accommodation. E-time is subject alone to constraints of Bayesian updating.<sup>74</sup> C-time is the time of physical events such as phonetic or brain processes. Discourse is thereby formally, and rather tritely in our case, an instance of a stochastic process with respect to e-time. This time reflects the order of admissible Bayesian updates.

Considered in terms of representatives, a discourse will be a sequence of probability spaces, i.e. of pairs  $(\mathcal{F}^j, P^j)$ . The left projection  $\{\mathcal{F}^j\}$  of this sequence is an increasing sequence of Boolean algebras, i.e. a sequence such that for integers  $j = k$ ,  $\mathcal{F}^k \subseteq \mathcal{F}^{k+1}$ . Intuitively, this means that the space of possibilities is partitioned by increasingly finer sets of propositions. Specificity of descriptive options does not in general decrease in discourse, as Lewis (1979) has observed; and the notion of an increasing sequence of algebras explicates this idea. The right projection will be a sequence of probability functions, each extending the previous one subject to reallocations of probability by conditioning on newly accepted assertions.

Time, either way, is assumed isomorphic to a subinterval of the integers. A more exciting approach to e-time would assume dense time, that is, a set of moments of time isomorphic to the rationals. This would imply that between any pair of distinct times  $t$  and  $t''$  we can always insert a distinct third,  $t'$ . Dense ordering might offer an elegant, fully monotonic way of treating accommodation phenomena in the discourse record, but for present purposes we keep this possibility implicit.

We identify the time index  $t = t_e = t_e(j)$  with the discourse time of  $j$ . As a default, utterance time  $t_c$  will be set equal to  $t_e$ . However, in the case of accommodation, the two kinds of time diverge. I assume that an accommodated constraint introduced at c-time  $t_c$  is to be taken to have been operative at some e-time  $t_{e-k}$  where  $k > 0$ . The basic idea here is that monotonicity of ostensible updates is to be preserved as far as possible. (Non-monotonicity proper, which amounts to undoing deterministic presuppositions, takes us outside the strictly Bayesian framework.) The possibility for e-time and c-time to diverge also affords an ostensibly monotone treatment of denial. Rather than assume that denial of a proposition  $E$  in some way erases  $E$  from common ground, we hold that denial is a refusal to ratify  $E$  becoming CG. When the denial is flat, i.e. by utterance of ‘No’ or, in a logical language, of ‘ $\neg E$ ’, the refusal is coupled with an assertion of  $\neg E$ .

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<sup>74</sup>It is modelled after, generalizes, and explicates Collingwood’s ‘logical time’.

## 6. Issues and Evidential Relevance

Typically, assertions are made in support of one possible resolution of an issue. A binary, dichotomic issue  $H$  is a bi-partition  $\{H, \neg H\}$  of the carrier set  $\Omega$  of possibilities (possible worlds) worlds of the domain of the CP probability function, to the cells of which distinct preferences attach at least ostensibly, i.e. for argument's sake. Example: Let  $H$  be

(2) Kim can deliver the letter.

Impute to the assertor of (1), *Kim walks*, a preference for  $P^{j+1}(H)$  to be larger than  $P^j(H)$ , as large as can be. Impute to the sceptical addressee (or a sceptical demon in back of the addressee's mind) a preference for  $P^{j+1}(\neg H)$  not to be smaller than  $P^j(\neg H)$  and perhaps even larger. Intuitively, we say that the speaker will have a doxastic preference for  $H$ , here (2), and the addressee for  $\neg H$ , here

(3) Kim cannot deliver the letter.

Observe now that (1) does not intuitively entail (2), but is, more or less strongly, an argument for (2) and thereby against (3). This choice of examples is no accident. Unlike familiar modal-logical frameworks, the probabilistic framework affords non-deductive relevance relations. These play an essential role in explanation of certain language phenomena.

In Section 2, we have already met the general notion of relevance of a proposition as a change in expectations of random variables brought about by conditioning on that proposition or, more generally, by a change in the probability of that proposition. We also saw how probability was itself a special case of expectation. Replacing the general random variable  $X$  by the support proposition  $B$  of an indicator random variable  $X_B$ , we say that proposition  $A$  is *positively relevant* to a proposition  $B$  at  $j$  iff  $P(B|A) > P(B)$ , *negatively relevant* to  $B$  iff  $P(B|A) < P(B)$ , and *irrelevant* to  $B$  iff  $P(B|A) = P(B)$  or  $P(A) = 0$ . Note that when  $P(A) = 1$ ,  $P(B|A) = P(B)$  for any  $B$ . Relevance relations determine the effects of  $A$  on the probability of  $B$  if  $A$  were to become a presupposition, say at  $j + 1$ , ceteris paribus.<sup>75</sup>

So far we have talked of evidential relevance mainly in qualitative. But there are also several families of numerical (i.e. number-valued) functions which explicate the notion of degree or amount of relevance. The most immediately perspicuous such function is surely  $\text{rel}_Y^i(X) =_{df} P^i(X|Y) - P^i(X)$ , defined to be 0 when  $P(Y) = 0$ . This is the difference between the

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<sup>75</sup>Not only this. By a generalization of conditioning (Jeffrey 1965), variously called probability kinematics or Jeffrey-conditioning, relevance relations can also tell us how a change in  $P(A)$  short of having it attain a value in  $\{0, 1\}$  would affect  $P(B)$ .

conditional and unconditional probabilities of proposition  $X$ , the conditional probability being computed conditional on  $Y$ . Thus,  $\text{rel}_H^i(A) =_{df} P^i(H|A) - P^i(H)$  measures the relevance of  $A$  to  $H$  in  $i$ . Its value is zero when there is no difference.

Somewhat less perspicuous at first sight, but also mapping irrelevance to zero degree, is the Turing-Good function,  $r_H^i(A) =_{df} \log[L_H^i(A)] =_{df} \log[P^i(A|H)/P^i(A|\neg H)]$ , here instantiated as before and defined to be zero when both numerator and denominator are zero, or either is undefined, and going to negative or positive infinity when just one of them is zero. This function is the logarithm, to any convenient base, of the ‘Bayes factor’ (a.k.a. likelihood ratio for simple hypotheses  $H$ )  $P(A|H)/P(A|\neg H)$  by which prior odds  $P(H)/P(\neg H)$  of  $H$  must be multiplied to obtain posterior odds  $P(H|A)/P(\neg H|A)$  of  $H$  conditional on  $A$ .

All commonly used relevance functions preserve ordinal relations among degrees of positive and negative relevance over the range that falls short of extreme relevance, i.e. as long as  $0 \neq P(H|A) \neq 1$ . At the extremes, the Bayes factor and therefore its logarithm may equi-value relevance relationships distinguished by the difference measures. So relevance functions are monotone, but not strictly monotone, increasing functions of one another. It may happen that, for given  $P^i$ ,  $A$  is more relevant to  $H$  than  $B$  is under one relevance function  $f$ , whereas  $A$  and  $B$  are equirelevant to  $H$  under another relevance  $g$  function defined in terms of  $P^i$ . What never happens is that a relevance function  $h$ , defined in terms of  $P^i$ , will make  $B$  more relevant to  $H$  than  $A$  is. Nor will any such functions disagree on whether or not  $A$  is irrelevant to  $H$  (though some functions, e.g. the Bayes factor, identify irrelevance with value 1, the value by which priors will be multiplied).

The various functions have their advantages and disadvantages for diverse purposes: additivity under certain assumptions, sensitivity or otherwise to prior probabilities, etc. For our purposes it really makes no difference which function we pick, though in Merin (1994b, 1999, in press) I do look at phenomena where the log-likelihood-ratio function is best. If one had to choose just one relevance function, this would be the one to choose. When I argue in terms of the *rel* function, this is chiefly because it is more intuitive to read.

Relevance gives us a kinematics of belief. It represents directed context-change potential, the direction and size being assessed with respect to whichever might be the propositions that are of interest to us.<sup>76</sup> For the

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<sup>76</sup>This is why ‘informativeness’ defined as the reciprocal of probability or as some function thereof (which co-incides with a relevance function only in cases which are too special to be paradigmatic) is, in general, of little or no use in descriptions of meaning. One should ask for proof of any assertion to the contrary, and have it checked by a

dynamics, to pursue the physicalist metaphor in a way more literal than is usual, we should also have to consider preferences. Here we ignore them to the extent of treating them as fixed parameters of the issue as in our above example. We thus remain in the domain of context-dependent (indexical) semantics, as distinct from the more general realm of pragmatics proper.

In this restricted framework, various forms of presupposition can be explicated, of which the traditional ones—fully deterministic with judgmental probability 1 and invariant under denial—are just a subclass. In particular, probabilistic presuppositions, i.e. more general probability constraints will be defined, and a negation-invariant sub-kind of them identified.

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logician, if logic or mathematics at large is not one's specialty. Expected informativeness, familiar from Shannon's signal transmission theory and from the literature on the design of experiments, has uses in the analysis of questions, as shown in teaching exercises on how to design questions so as to maximize expected informativeness of possible answers.

## 7. Probabilistic Presuppositions

A probabilistic presupposition (at its most general)<sup>77</sup> which obtains at a context  $j$  is any equation or inequation satisfied by  $P^j$  which is not already a theorem of the probability calculus. Examples:

$$(4) P^j((2)|(1)) > P^j((2)); P((2)) = P((3)); \dots$$

Deterministic presuppositions are a special case of probabilistic presuppositions. They assign unit or zero probability to all their propositional terms. Example, for some context  $j$ :

$$(5) P^{j'}((1)) = 1 \wedge P^{j'}((3)) = 0.$$

Deterministic presuppositions can be intuited as presuppositions of propositions that are within the domain of the CP probability function,  $P$ . For example, we can paraphrase the constraint (5) by saying that ‘Kim walks’ and ‘Kim can deliver the letter’ are common ground at  $j'$ .<sup>78</sup> In thus intuiting them, we simply ignore—or better, in the phenomenologist’s terms: we treat as transparent—the doxastic qualification. By contrast, we cannot express ourselves as simply for the constraints of (4). The doxastic relations in their specification are not transparent.

Transparency, I take it, is one useful way to interpret the T-axiom,  $\Box(X) \rightarrow X$ , that distinguishes properly epistemic modal logic from doxastic modal logic (Hintikka 1962). When a doxastic agent is truly certain of a proposition  $E$ , he must ascribe knowledge of  $E$  to himself when challenged. (If he had doubts about the reliability of his justification, he could not be certain save in a Pickwickian sense.) When a doxastic agent asserts  $E$ , he claims that  $E$  should become a common certainty, which is as close to making a knowledge claim as human beings will ever come. What is to be believed by all who are open to reason—and ‘all’ includes the speaker—is knowledge to the best of the speaker’s present knowledge.

In contrast to deterministic presuppositions, properly probabilistic presuppositions must be represented as elements of a richer algebra of propositions than deterministic presuppositions. They are always elements of a proposition algebra which includes CP-probability statements. We could rewrite (5) to ‘ $(1) \wedge \neg(3)$ ’, but we could not do the same for (4).

Some probabilistic presuppositions are exemplified in the semantics of the connective *but*. Thus, we have as a condition of most felicitous uses of clause-coordinating *A but B* the condition that, for a given issue proposition

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<sup>77</sup>We shall narrow down this characterization below to pick a subclass which behave much like traditional presuppositions of a sentence.

<sup>78</sup>Treating our sentences as atomic.

$H$ ,  $P^j(H|A) > P(H) \wedge P^j(H|B) < P(H) \wedge P^j(H|A \cap B) < P(H)$ .<sup>79</sup> The effect of the update proposed by utterance of *A but B* will indeed be to constrain the common posterior to satisfy  $P^{j+1}(A \cap B) = 1$ . At this point all the relevance of *A* and *B* will have been spent and our specification of the probabilistic presupposition implies that, if only *A but B* is uttered,  $P^{j+1}(H) < P^j(H)$ .

Thus, a DTS will treat what is called the ‘conventional implicature’ attaching to *but* as a probabilistic presupposition in the general sense introduced above. This taxonomic decision, even though we cannot here claim anything like preservation under denial,<sup>80</sup> is not idle. At  $j + 1$ , the intended CPo, the two conjunct propositions *A* and *B* could no longer be relevant to any proposition, having already acquired unit probability. When  $P(A) = 1$ , the conditional probability  $P(B|A) =_{df} P(A \cap B)/P(A)$  equals  $P(B)$ . Once we have reached the target context  $j + 1$ , the presupposition is only a memory of relations obtaining in the evidential past.

Note also that the ordered triple  $(H, P^j(H), P^{j+1}(H))$  consisting of *H* and of the probabilities representing the doxastic status change of *H* amounts to an instance of what is often called ‘particularized conversational implicature’.<sup>81</sup> Using well-known if imprecise terminology, we should say that the finding of *H* will be an abductive inference, in a sense loosely related to what C.S. Peirce may have intended to convey by that term. Probability changes here are not in general changes to unit or zero probability. This property takes care of the defeasible and relatively weak status of implicature which, in addition to the frequently implicit nature of *H*, distinguishes it from assertion.

So far we have spoken of probabilistic presuppositions in strict analogy

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<sup>79</sup>See Merin (1999), and Merin (1996), which is fuller but in German. I am not currently aware of any aspect of *but* which resists treatment along the lines developed there. Some elementary aspects of *but* are nicely described by earlier, informal descriptions of it (e.g. Fogelin 1967), or by those of French *mais* (e.g. Ducrot 1972). For others, indeed already for innocent-looking *Kim is tall but Sandy is short*, one really wants quite a bit of what probability theory can deliver, more than is readily apparent from the above formula. Else one wants something of comparable power. Non-monotonic logics I have seen do not have it. The ranking function theory of Spohn (1988) does, up to a point. At any rate, the simple pioneer approaches would seem to be mainly of historical interest today.

<sup>80</sup>Grice (1989) makes a useful observation about *but*: that it will not smoothly yield to wide-scope negation: cp. ‘It is not the case that Kim walks but she talks’. What might explain this fact is the complexity of its presupposition and the composite act-structure of a concession and a claim which it reflects. There is no probability-free assertion that constitutes the import of *A but B* and which is being denied.

<sup>81</sup>It is an instance of this notion under the intuitive interpretation in Kripke (1977). Recall his scenario of two burglars in a jewellery shop. One of them says to the other ‘The police are around the corner’ and the implicated meaning is something like ‘It is time to get away’.

to the usage of presupposition-at-a-context. But of course there are also speaker-presuppositions and, mediately, presuppositions of utterances and, more mediately yet, potential presuppositions of sentences.

The overriding criterion for presuppositional status generally is derived from coherence constraints on Bayesian updates and stochastic relevance relations. More narrowly, the criterion is augmented by the criterion of preservation under denial, the traditional hallmark of presuppositions. This property turns out to hold also for certain probabilistic presuppositions.

Perhaps the most striking instance is one that has, ever since Schröder (1890:I,134), generally been treated as a conversational implicature. It represents a proper subset of what Gazdar (1979) calls the Clausal Quantity Implicature of *or* and of *if* and which he explicates by use of Hintikka's (1962) epistemic necessity operator  $K$  (for speaker's knowledge). Gazdar rendered Schröder's intimation as a set  $\{\neg K(A), \neg K(\neg A), \neg K(B), \neg K(\neg B)\}$  of sentences. The subset we pick on is  $\{\neg K(A), \neg K(B)\}$ . We assume that the equivalent felicity constraint

$$(6) P^j(A), P^j(B) < 1$$

attaches as a lexical *ceteris paribus* constraint to utterances of  $A$  *or*  $B$  uttered at  $t(j)$ .<sup>82</sup> Thus, it is a probabilistic presupposition at  $j$ . The speaker of

$$(7) \text{ Kim walks or Sandy talks}$$

speaker-presupposes that the current context satisfies (6). Assume that the intended effect of the assertion is to constrain  $j + 1$  to satisfy

$$(8) P^{j+1}(A \vee B) = 1.$$

Denial of  $A$  *or*  $B$  thus amounts to a proposal that the Common Posterior be not  $j + 1$  but rather an alternative  $j + 1'$  (parse as:  $(j + 1)'$ ) such that  $P^{j+1'}(\neg(A \vee B)) = 1$ , i.e. such that

$$(9) P^{j+1'}(\neg A \wedge \neg B) = 1.$$

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<sup>82</sup>We leave open for now whether or not there is a rationale for this lexical convention, and what it might be. Schröder had appealed to comparative informativeness, defined by relative logical strength, and to brevity, to explain an intimation of speaker's ignorance about the truth value of each of  $A$  and  $B$ . His proposal was routinely conveyed by Tarski (1941), who definitely had read Schröder, and Quine (1950). These were the leading elementary logic primers of their time, and the proposal was there extended to *if* (with  $\neg A$  replacing  $A$ ). The proposal is widely attributed to Grice (1961), who must have discovered it independently. (See the original: the relevant passage is omitted from the 1989 reprint on grounds of redundancy.)

In other words, at  $j + 1'$ ,  $\neg A \wedge \neg B$  is to be a deterministic presupposition. But note that  $P(\neg A \wedge \neg B) = 1$  entails  $P(\neg A) = 1 \wedge P(\neg B) = 1$  for any probability function  $P$ . This, in turn, entails  $P(A) < 1 \wedge P(B) < 1$ . Thus, (9) entails that

$$(10) \quad P^{j+1'}(A) < 1 \wedge P^{j+1'}(B) < 1.$$

Our probabilistic presupposition is therefore preserved under denial. It is thereby a presupposition, in close to the traditional sense, of the sentence *A or B*. Less sloppily put, it is a speaker presupposition of the person who asserts *A or B*.<sup>83</sup>

An accommodated additional deterministic constraint to the effect that *A* and *B* are disjoint, i.e.  $\neg(A \wedge B)$ , is again a presupposition in the technical sense just introduced. Such a constraint should be operative at  $j$ , even if it is inferred only after *A or B* has been uttered. The inference might be based on particularized world knowledge, or imposed by more general discourse considerations, one of which we shall meet below. At any rate, a constraint

$$(11) \quad P^j(\neg(A \wedge B)) = 1$$

is deemed to obtain, and we can easily see that it is again preserved under denial of *A or B*. If the target context  $j + 1'$  of the denial satisfies (9), i.e.  $P^{j+1}(\neg A \wedge \neg B) = 1$ , it must also satisfy

$$(12) \quad P^{j'}(\neg(A \wedge B)) = 1.$$

The disjointness constraint will translate as  $\neg K(A \wedge B)$  in Gazdar's modal framework. It is therefore none other than what Gazdar defines to be the Scalar Quantity Implicature of binary *or* and what has subsequently been dubbed its 'strong' scalar implicature (Hirschberg 1985). Thus, we see that a subset  $I$  of Gazdar's implicatures for *or*—as we shall see, *all* those implicatures which are not entailed by a subset of  $I$  augmented by his 'Quality' assumption that assertion be confident—are probabilistic presuppositions in the strict sense defined by preservation under denial.

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<sup>83</sup>I am grateful to Laurence Horn of Yale University, whose 1989 book is an authoritative source on pragmatics, negation and denial, for finding these claims worth taking exception to when they were presented to a larger audience at the Formal Pragmatics Workshop, Berlin, March 2001. However, I am not persuaded that the objection rested on grounds other than a preference for invariant scope of terminology. The claims are doctrinally related to the account of 'pragmatic scales' and of the action of negation on scalable predicate paradigms offered in Merin (1999: Theorem 7). The account differs from the well-known proposal for 'pragmatic scales' that is presented most fully in Horn (1989), for one, in not entailing that coherent everyday discourse with and about numbers is not part of natural language (see Merin 2003).



In current taxonomy,  $\neg(A \wedge B)$  is generally treated as a conversational implicature of *A or B* and Gazdar's Clausals are almost always treated likewise. However, we must not be fazed by this surfeit of taxonomic options. Taxonomic categories of cultural objects should be explanatorily useful. This does not mean that they should pretend to determine natural kinds. In the Bayesian framework (of which the framework of doxastic modal logic KD is a proper coarsening) we assign presuppositional status on the most conservative and robust of criteria. What matters primarily here is the evidential status of the propositions concerned, not the putative causal history of their coming to mind. The latter, as is well known from the literature, is beset by deep uncertainties. The former, at the very least, has a robust and intelligible explication. It is for this reason, that we should treat them as presuppositions first. Their putative causal history for which the label 'implicature' may stand, can still be treated separately.<sup>84</sup>

The idea that presuppositions, running under this very label, are conversational implicatures in the sense of Grice or are generated as such is not new (see Kadmon 2001:205-217 for literature going back to 1976), including Levinson (1983). However, the first instance of this idea, and an instructive one in several respects, is the re-introduction of the term 'presupposition' into post-World-War-II philosophy. The term 'presupposes', as Rumfitt (1998) notes, does not occur in Strawson (1950), the celebrated attack on Russell (1905), but makes a first appearance in Strawson (1952), at p. 175. There, it designates a relation between an assertoric sentence *S* and a sentence *S'* expressing a necessary condition for *S* having a truth value. Strawson's instance of *S* is *All A are B*, for *S'* *There is at least one A*. The presupposition *S'* is explained (op. cit. p. 178f.) as a scalar implicature, with credit given to Grice for the general pragmatic rule that 'one does not make the (logically) lesser, when one could truthfully (and with equal or greater economy) make the greater, claim'. Explicating bare logical *S* as  $\neg\exists[Ax \wedge \neg Bx]$  and noting that  $\neg\exists[Ax]$  would be true if *S'*, i.e.  $\exists[Ax]$ , were false, Strawson derives the presupposition.

Strawson's diagnosis of lack of truth-value in the case of presupposition failure is, in turn, diagnosed as being confused by Sellars (1954:211), who introduces the current 'shared belief' view of presupposing one page later. On replacing Strawson's lack of truth-value by some dynamic explication of infelicity, we obtain a conversationally implicated pragmatic presupposition.<sup>85</sup>

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<sup>84</sup>There is a reflex of this in the notion of denial. Denial, on the decision-theoretic view of discourse, is essentially linked to joint decision-making. A denial, on this view, is not an erasure from common ground, but a proposal which is alternative to a contrary proposal that may have been prior to it in c-time, but which never became ratified as common ground and does not, therefore, precede it in e-time (see Merin 1994a).

<sup>85</sup>Sellars himself opted for Frege's logic for the assertion of *all* and conventional extra-

However, the awesome power of the implicatural argument, and thereby of the doctrine associated with Grice, can be gauged by noting that it might also apply to the existence presupposition of *The A is (not) B*, given an instance of *B* that is of reasonable length. But this is not something that Strawson considers, who (on pp. 184-194, and perhaps wisely) explores the anaphoric properties of the definite article ‘*the*’ more deeply than anyone before him appears to have done.

Strawson also hypothesizes deeper properties of existence presumptions which defy expression. These latter ineffability properties are motivated by the uncommon assumption that  $\text{Some}(A,B)$ , whose nearest logical rendition is  $\exists x[Ax \wedge Bx]$ , presupposes that there are  $x$ . The resulting ineffability claim (Strawson1952:191) seems to bring the doctrine close to Collingwood’s non-statement view of absolute presuppositions. Since, by Collingwood’s doctrine, to any assertible proposition there corresponds an open question, Strawson’s diagnosis of a lack of truth value appears now to characterize the case in which, for Collingwood, ‘the question does not arise’. And indeed, this very clause is proposed as an explicandum (1952:174), and the presupposition of a statement is defined as what must be true for the question of the truth or falsity of the statement to arise (p. 191).

In Section 12 we explore the implications of our above technical findings and of Collingwood’s ‘question’ paradigm for the presupposition projection problem. Gazdar’s solution proposal for it rested on having Clausals precede presuppositions, at least those in taxa (i), (ii), and (iii), in a scheme of consistent context incrementation, and thus giving them priority in case of a clash. A typical presupposition from taxon (i) will be the referent-existence presupposition attaching to definite descriptions. This is not, however, the only presupposition attaching to it (if we accept a presuppositional treatment at all). There is also the presupposition of uniqueness, or at least of relative uniqueness circumscribed by a ‘salience’ condition with a large potential for remaining formally unintelligible.

A resolutely anaphoric treatment of definite determiners *the*, *her*, *Kim’s* will aim to shift the problem of existence and uniqueness to a representational, discourse-procedural explication of definiteness. This tactic is perfectly reasonable, and it might well be putting the perceptual horse where it belongs, before the cart. But perception is not all it takes to build and move the cart. A justificational, complementary approach may yet elicit useful evidential and pico-political relations from the presuppositional half-way-house whose masonry is supplied by Russell’s logical form and whose contents are in principle candidates for an ‘implicature’ type rationalization.

The point we shall aim for in the next section pertains to such ratio-  

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assertoric meaning of the presupposition, in the spirit of earlier logicians and of Grice.

nalizations in a vein different from that of Grice. It rests on a relational property of presuppositions which becomes somewhat intuitable on considering the following existentialist dialogue:

- (13) Alpha: ‘Arcadia has at least one national pastime (I am happy to say).’  
Beta: ‘But (luckily)<sup>86</sup> it has no more than one’.

To see the scope of the phenomenon, we begin by considering relations already explored in this section, namely between a putative assertion and a probabilistic presupposition which is sometimes called an implicature. Consider this dialogue between (let us call them) a logical positivist, and a moderate logical negativist:

- (14) Alpha: ‘ $A \vee B$  (I am happy to say).’  
Beta: ‘But (luckily) not both (i.e.  $\neg(A \wedge B)$ )’.

Where does the *but* come from, here and in ex. (13)?

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<sup>86</sup>In academic discourse, Beta would more likely say ‘unfortunately’, which speakers of the dialect understand as being completed by ‘for my esteemed colleague’.

## 8. Positive and Negative Presuppositions

It is an elementary fact of probability that  $\neg(A \wedge B)$  is always negatively relevant to  $A \vee B$  when these two propositions can be relevant to any proposition at all.<sup>87</sup>

FACT: If  $0 < P(\neg(A \wedge B)), P(A \vee B) < 1$ ,  
then  $P(A \vee B | \neg(A \wedge B)) < P(A \vee B)$ .<sup>88</sup>

This fact suggests that we can distinguish pragmatic presuppositions of a class of sentences which are entailments of its assertion from those which are accommodated entailments of its denial.

Thus,  $K(A \text{ is true})$  is entailed by  $K(\text{someone knows } A)$  and is therefore a positive (and deterministic) presupposition, being a presupposition in as much as it is preserved under denial. By contrast,  $K(\neg A \vee \neg B)$ , which is entailed by  $K(\neg(A \vee B))$  is a negative (and in our terms probabilistic) presupposition of  $K(A \vee B)$ . Example:

(15) Kim walks or Sandy talks

has negative presupposition

(16) Kim doesn't walk or Sandy doesn't talk.

On this basis I suggest that we partition the class of pragmatic presuppositions of expressions into *positive presuppositions* and *negative presuppositions*, defined by relevance.

If  $A$  is a probabilistic or deterministic presupposition of  $B$ , and if  $A$  is positive (negative) to  $B$ , then it is a positive (negative) presupposition of  $B$ .

Recall that, if  $A$  entails  $B$ , then  $A$  and  $B$  are positively relevant to one another if each is relevant to any proposition at all. If  $\neg A$  entails  $B$ , then  $A$  and  $B$  are negatively relevant to one another, if each is relevant to any proposition at all. When we instantiate these relational schemata to designata of empirical constructs, the art of judgment consists in specifying our instances.

The existence presupposition of a definite description sentence would be an instance of a positive presupposition  $\Theta$  for a simple affirmative sentence  $R'$  when the definite NP occurs in topic position. Example:  $\Theta = \textit{France has a}$

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<sup>87</sup>To be potentially relevant in doxastic context  $P$  to any proposition at all, a proposition  $D$  must be  $P$ -contingent, i.e. satisfy  $0 < P(D) < 1$ .

<sup>88</sup>The proof is immediate:  $A \wedge B$  entails  $A \vee B$ , so they are positive to one another if  $P$ -contingent; and negation reverses relevance sign.

king;  $R' = \textit{The king of France is bald}$ . Under these circumstances,  $\Theta$  is often called an entailment of  $R'$ . We can retain this static, logical characterization and yet, by attention to e-time, distinguish it from an entailment of  $R'$  that is ostensibly being asserted as part of  $R'$ .<sup>89</sup>

When we deny the comment part of a sentence with a definite description in topic position as in  $S' = \textit{The king of France is not bald}$  the existence presupposition  $\Theta$  reveals itself as a presupposition in no uncertain terms. But now, if we treat the original  $R'$  as a proposition and its denial  $S'$  as the boolean complement  $\neg R'$ , the existence presupposition  $\Theta$  has become a negative presupposition (of  $S'$ ).<sup>90</sup>

However, many of our best-loved lexical presuppositions are already negative presuppositions in affirmative occurrence and probabilistic or equivalent inductive reasoning plays a crucial part in establishing them to be thus.

For example, if you have been beating your spouse habitually—the traditional example situation in the modern literature on aspectual presupposition—, enumerative induction will suggest that you will continue doing so and indeed are doing so at present.<sup>91</sup> Suppose that this is the assumption which we impute to competent language users, by constraining their sets of admissible  $P$ -functions so as to make this inductive inference highly probable.

Then the proposition that you do not beat your spouse now, which is the ‘asserted’ part of *You have stopped beating your spouse*, will be negative to the presupposition that you have been beating your spouse, i.e. to *You have beaten your spouse*.<sup>92</sup> In a framework of actual or virtual dialogue, which comes naturally enough with a pretense doctrine of accommodation,<sup>93</sup> negative presuppositions of the aspectual kind that we have just considered

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<sup>89</sup>But suppose we take  $\Theta$  for granted as presupposed at  $j$ . Then the assertion, defined as projected information increment, will be not  $R'$  but the logical residual of  $R'$  by  $\Theta$ , the material implication  $\Theta \rightarrow R'$  whose nearest idiomatic gloss is *If there is a king of France, he is bald*. Now, relative to any context  $j-k$  at which both  $\Theta$  and  $\Theta \rightarrow S$  are doxastically contingent, they are negative to one another. (The proof is immediate via  $(\Theta \rightarrow R') \leftrightarrow (\neg\Theta \vee R')$ ). Since the residuation relation between components of composite information is perfectly general, we have here, perhaps, some roots for the intuitions that sometimes attach to the learned notion of *dialectic*. Every synthesis can be fractioned into a pair of more or less mild antitheses.

<sup>90</sup>But it will again be negative to the information increment, here  $\Theta \rightarrow \neg R'$ . Below we shall return to negative presuppositions in the context of accommodation.

<sup>91</sup>With the usual long periods of respite that are allowed by the continuous tense *salva veritate*.

<sup>92</sup>See the footnote after the next one.

<sup>93</sup>The first step onto this slippery slope is taken when you buy Stalnaker’s account of pragmatic presupposition.

can be given a useful historical interpretation. As suggested above, we look beyond the bare common-ground status of a presupposition  $\Theta$ , which is ostensible common ground at  $j$ , the current common prior. We now attend to the *source* and act-type *record* of  $\Theta$  and identify it as an ostensible previous claim, made at some point in e-time  $j-k$ , say,  $j-1$ , by a virtual or actual debating opponent of the speaker's (see Merin 1997a). Within the terms of reference set by Collingwood's benchmark instance for aspectuals, this debate finds ready examples. Consider a variant of an earlier dialogue example, namely

- (17) Alpha: 'Sandy has been seen beating his spouse. [A]  
 Beta: 'But he has now stopped' [B].<sup>94</sup>

Next to the inductive relation already mentioned (and to be investigated more closely now) we may well imagine that Alpha and Beta are, respectively, a detractor from, and a defender of Sandy's good moral standing.<sup>95</sup> But we may also focus on the issue (possibly an intermediate issue) of whether or not Sandy will continue beating his spouse so that 'Sandy has been, is, and will be beating his spouse' is true.

Sentence-initial *but*, in this placid indicative environment tells us that the two assertions are compatible ( $P^j(A \wedge B) > 0$  (where  $t(j)$  is the e-time and c-time of Beta's utterance) and indeed that Beta deems both of them true. As we have set up our dialogue, Beta is presupposing  $\Theta$ . Yet, concomitant with the argumentative preference structure which we have presumed;<sup>96</sup> this presupposition was a concession by Beta to Alpha.

We can diagnose its status by the fact that it is suspendible by a suspender clause, *if indeed he ever did beat her* (Horn 1972/76), which Beta could tag on to qualify his admission of  $\Theta$  as hedged. It will then be a hedged admission made provisionally, by default of good evidence to the contrary. It will not thus be a deterministic presupposition.<sup>97</sup> However, Beta cannot so suspend his own assertion to the effect that Sandy is not now misbehaving and will perhaps not ever again do so. (This last is presumably what

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<sup>94</sup>The veridical '*been seen to*' construction avoids an intimation, which does accompany '*has beaten*' or '*has been beating*', that Alpha is already conceding stoppage in advance. It gets as close as any non-stilted construction will get to capturing the tense operator P 'during at least one time prior to the present time' introduced by Prior (1957). 'P(Sandy is beating his spouse)', or some probabilistic (measure-theoretic) refinement of it, is our  $\Theta$ .

<sup>95</sup>The issue between them might also be something as concrete as Sandy's promotion to Minister for Family Affairs.

<sup>96</sup>It may be deeply founded or else merely assumed for argument's sake among profoundly disinterested observers.

<sup>97</sup>We might intuit it to be the admission of a mere prejudice in favour of past beating and we shall see below how our framework allows us to represent this intuition.

*stop* intimates, too, *ceteris paribus*.) The asymmetry is readily explained when we take into account the interest structure (cf. Merin 1994a). It also explains immediately why

(18) Kim hasn't stopped beating her spouse

in spite of admitting, if push comes to shove, a (forced, hamfisted) construal in which the presupposition, too, is denied, seems to intimate much more securely than the corresponding affirmative, obtained by *n't*-deletion, that Kim beat her spouse. That it does so becomes plain on observing that we cannot tag on a suspender *if indeed she ever did*. Why it does so should be plain enough in view of the basic assumptions that inform the present approach to a DTS.<sup>98</sup>

Once  $\Theta$  is *j*-presupposed, it can no longer be relevant to *A*, nor to any other proposition at any *j'* such that  $t_e(j') \geq t_e(j)$ . But at *j*-1 we have  $\Theta$  positive to the *H* at issue (where *H* = 'Sandy beats and will beat his spouse' or *H* = 'Sandy is bad') while Beta's assertion *B* is negative to *H*. Given *conditional independence* of *A* and *B* from one another, both relative to *H* and relative to its complement,  $\neg H$ , this inverse relevance-sign relation to *H* will hold if and only if  $\Theta$  and *S'* are negative to one another.<sup>99</sup>

This condition, call it doubly conditional independence (DCI) with respect to *H*, can also be characterized as follows. DCI obtains in a doxastic context  $P^i$  when *A* and *B* are probabilistically independent from one another relative to the indicator random variable  $X_H$  with probability mass function given by  $P^i$ , i.e. when  $P^i(A \wedge B|H) = P^i(A|H)P^i(B|H)$  and  $P^i(A \wedge B|\neg H) = P^i(A|\neg H)P^i(B|\neg H)$ . This condition is often written  $(A \perp B | \pm H)_i$  or  $(A \perp_i B | \pm H)$ , omitting the index when it is understood. In Merin (1999), I have proposed to identify DCI as a default presumption of natural language semantics, particularly so because it makes  $A \wedge B$ , the conjunction of propositional information of *A* and *B*, relevance-functional.<sup>100</sup>

Now,  $(A \perp B | \pm H)$  implies that *A* and *B* are positive (negative) to one another whenever their individual relevance to *H* are of like (unlike) non-zero polarity. This theorem<sup>101</sup> provides a link between, on the one hand, the

<sup>98</sup>Not to be confused with a rote global substitute of terms from the decision-theoretic literature into the language of language science.

<sup>99</sup>In terms of unsigned, but non-zero relevance relations, I call this a *euclidean* relevance situation, after the eponymous relation type (cf. Chellas 1980).

<sup>100</sup>The log-likelihood ratio of Appendix 1 becomes additive. Again, though, in making the default assumption, we are dealing in ostensibilia, for nature is full of unsuspected dependencies whose surprisingness testifies to the default assumption's presence.

<sup>101</sup>Known as the Reichenbach Common Cause Theorem under an inessentially different interpretation; cf. Reichenbach (1954).

relevance relation of a presupposition  $\Theta$  to an associated assertion component  $A$  and, on the other hand, the respective relevance relations of  $A$  and  $\Theta$  to an ulterior proposition  $H$  at issue. Our relevance constellation was an instance of it.

At this point, pretense has taken leave of the paradigm of mutual connivance. We are now back in the original sophisticated, and somewhat sophisticated context of use that had evidently been envisaged by Eubulides. Suppose Beta is not a friend of Sandy's, while Alpha is. With feigned solicitousness, Beta says '*Sandy has stopped beating his spouse*'. If Alpha falls for this ploy, he will, unless and until reflection takes over, adopt the implicit role structure.<sup>102</sup> This structure identifies the presupposition that Sandy beat his spouse as Alpha's own contribution. But the last person one should doubt in adversarial procedure is oneself, and so Alpha should eagerly swallow it—hook, line and sinker. Having swallowed, Alpha finds himself in the role of accuser of Sandy, with Beta coming to Sandy's rescue. Since there is now something which Sandy has to be rescued from, damage is already done, until such time as Alpha makes a violent effort to repudiate the manipulation. And indeed, despite appearances projected by Sandy's champion, of having outweighed the accusation (we have a *but*, not a mere *though*), an admission of past beating might be objectively sufficient to disqualify Sandy, who cannot afford a Grade A spin machine, for promotion to high office.

This pattern of presupposition introduction generalizes fairly well, irrespective of whether our context is straightforward or deceptively sophisticated. The pattern is an important instance of the non-zero relevance disjunct of our disjunctive condition on proper accommodation, which I will recall in a moment.

If the ostensible aim and therefore preference of an assertor of a proposition  $S$  is to raise the probability  $P(H)$  of a proposition  $H$  at issue let us call  $H$  the *protentive speaker meaning*, or briefly: *protentive meaning*, of the utterance.<sup>103</sup> Informally, it corresponds to 'what the speaker is getting at'. However, we do assume issue-based discourse in which the addressee's aim, actually or by convention, is to lower  $P(H)$  or keep it fixed. I will not labour the neologism, but when in need of a simple description of a typical  $H$ , one might think of it for mnemonic purposes.

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<sup>102</sup>The efficacy of this ploy is well known to interrogators. Its unacceptably high rate of false positive admissions evinced is almost equally well known. Thus, putative evidence obtained by means of this technique will be ruled inadmissible in many systems of legal procedure.

<sup>103</sup>This neologism (Merin 1999: Def 7.), which has a bona fide root in Kantian terminology, sounds a bit pretentious, but in the end one may find it useful. Check for its nearest neighbour in H.P. Grice's (1968) plethora of speaker and utterance meanings.



Now, in all but certain pathological situations<sup>104</sup> the relevance signs of  $A \wedge B$  and  $A \vee B$  with respect to any given  $H$  are equal. A sufficient condition guaranteeing this equality of relevance polarity is, once again, DCI, i.e.  $(A \perp B | \pm H)$ . By elementary properties of relevance, this identity of sign will imply that  $A \vee B$  and  $\neg(A \wedge B)$  have opposite relevance signs with regard to  $H$ . Thus, if  $A \vee B$  is positive to  $H$  at  $j$ ,  $\neg(A \wedge B)$  will be negative to  $H$  at  $j$ , hence non-positive to  $H$ . Hence, the proposition  $\neg(A \wedge B)$  is negative not only to  $A \vee B$ , as it always is when either can be relevant to anything. It will, usually, also be negative to what  $A \vee B$  is positive to.

This is one reason, I should think, why so many of our best-loved presuppositions are what I called negative presuppositions. Presuppositions, as Lewis and already Stalnaker (1970) made plain in different terminology, are very often introduced by accommodation (non-zero accommodation in my proposed taxonomy). In a context where sides are taken—if only for argument’s sake—the negativity of presuppositions will amount to their being concessions made to an adversarial addressee or at least, if you will, to some adversarial, sceptical demon in back of the addressee’s mind. That such a presupposition should be identifiable with an actual or virtual assertion of the addressee’s is a simple corollary of its relevance properties.

Manfred Krifka has suggested to me that the prevalence of negative presupposition could be conditioned by a principle ‘What is said should be worthwhile saying’, specified to ‘It should be new and if it’s unexpected, so much the better’. I believe fulfilment of such a desideratum is entirely compatible with the procedure I have outlined. Indeed, it would be an instance of an ‘invisible hand’ type argument (Merin 1999:200). The logical informativeness gain implied by the local modification of inclusive *or* by accommodation of the negative presupposition known as its strong Scalar implicature, to what is, in effect, exclusive *or* (see Section 12 below) is a particular instance.

This effect is particularly striking when we consider the interplay of expansion and restriction of informational domains from the point of view of the partisan distribution of constraint introduction.

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<sup>104</sup>Those which, as a matter of formal fact, reduce to an instance of what is known among philosophers of statistics as Simpson’s Paradox.

## 9. ‘The duke of Paris is not bald’: Relevance Increase by Accommodation

Recall that we proposed that no accommodatum  $\Theta$  triggered by  $S$  should be positively relevant to  $H$ . Accordingly, I call an accommodatum *properly accommodable* at context  $j$  only if, besides being  $j$ -contingent ( $0 < P^j(\Theta) < 1$ ) in present c-time and prior in e-time to the e-time context accommodated to, it satisfies this non-positive relevance condition at the e-time context accommodated to, at which it ostensibly becomes common ground.<sup>105</sup>

The case where  $\Theta$  is irrelevant to  $H$  at the requisite context  $i$ —write:  $(\Theta \perp_i H)$ —is a prominent special case which leaves ostensibly unaffected the ostensible immediate interests of both parties that, by assumption, attach to  $H$ . Call  $\Theta$  in this case *each-way properly accommodable* and refer to  $\Theta$  as an ‘each-way proper accommodatum’ or as ‘*symmetrically uncontroversial*’. Indirectly, i.e. at a subsequent update, having  $\Theta$  presupposed may very well affect relevances of some assertion  $E$  to  $H$ . This constellation is one that tactically foresighted accommodators exploit with great skill.

They can do so, because an each-way proper accommodatum  $\Theta$  has a very desirable property in cases where we assert a sentence  $S$  whose negation,  $\neg S$ , non-vacuously and properly entails  $\Theta$ . (And where our doxastic attitude reflects non-vacuous proper entailment, which represents our intuitive stereotype of the entailment relation.)

Entailment  $\neg S \models \Theta$ , equivalently  $\neg\Theta \models S$ , means that  $\Theta \wedge \neg S = \neg S$  ( $\Theta \neg S = \neg S$ ), equivalently, that  $S \wedge \neg\Theta = \neg\Theta$  ( $S \neg\Theta = \neg\Theta$ ).<sup>106</sup> To be nonvacuous and proper, the relation must satisfy  $\emptyset \neq \neg\Theta \neq S$ , and this property will be reflected in doxastic commitments at a context  $i$  if  $P^i(S \wedge \Theta), P^i(S \wedge \neg\Theta) > 0$ . Example: Let

$R \equiv \neg S =$  ‘The duke of Paris is bald’,      *hence,*  
 $S =$  ‘The duke of Paris is not bald’;  
 $\Theta =$  ‘There exists a duke of Paris’;  
 $H =$  ‘There is a ready market for pate polish among the  
*beau monde* of France’.

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<sup>105</sup>The leftward conjunct of *also* and its equivalent for synonymous *too* does not. The worked example and a formal statement of the definition of proper accommodation is in Merin (1999:Sec.VI).

<sup>106</sup>Read  $AB$  and  $A \wedge B$  as  $A \cap B$  where sensible, similarly read  $A \vee B$  as  $A \cup B$ . In abstract boolean algebras, read them as  $A \sqcap B$  and as  $A \sqcup B$ . In the the space-saving  $AB$  notation for  $A \cap B$ ,  $A \neg B$  translates  $A \sqcap \neg B$ , ‘ $A$  and non- $B$ ’, and  $\neg AB$  translates  $\neg A \cap B$ , ‘non- $A$  and  $B$ ’. I have eschewed the space-saving and scope-indicating ‘bar’ notation  $\bar{A}$  for negation  $\neg A$  (see e.g. Merin 1999) in the interest of readers who may be unused to it.

For people who are actually uncertain about whether there exists a duke of Paris, as most of us should be,<sup>107</sup>  $\Theta$  is doxastically contingent. Moreover, it seems *irrelevant per se* to  $H$ . By contrast,  $R$  should be positive to  $H$ , given what we know about peer pressure exercised by the average *primus inter pares*. A bald duke of Paris, proud of his pate as befits a duke, would surely avail himself of pate polish to make it shine. The rest of the *beau monde* would follow suit, that is, mothball their wigs and start polishing away. Whether or not this imagined story of influence would actually pan out is of no concern to us. All we want to examine are the consequences of supposing that it does. (More humdrum example sentences could be thought of.)

A first, immediate consequence will be that  $S$  is negative to  $H$ : the probabilistic explication of relevance implies that boolean negation reverses relevance sign. In each case of our example we can also assume very plausibly that relevance of  $R$  and  $S$  to  $H$ , be it positive or negative, will not be extreme: i.e. will not amount to context-relative and relevant entailment  $R \vDash_i H$  or  $S \vDash_i \neg H$ , respectively.<sup>108</sup>

Let  $\text{rel}_H^i(S) =_{df} P^i(H|S) - P^i(H)$  measure the relevance of  $S$  to  $H$  in  $i$ .<sup>109</sup> Now we want to define the degree of relevance of  $S$  to  $H$  after  $\Theta$  has been accommodated, i.e. after conditioning on  $\Theta$ . Conditioning a probability function  $P(\cdot)$  on a proposition  $Z$  yields a probability function  $P'(\cdot) = P(\cdot|Z)$ .<sup>110</sup> Hence,  $\text{rel}_X^{i'}(Y) =_{df} P^{i'}(X|Y) - P^{i'}(X)$  (don't overlook the 'prime' symbol, '!') will measure the relevance of  $S$  to  $H$  after conditioning on  $Z$ . But this is equivalent, by the laws of probability calculus, to  $P^i(X|Y \wedge Z) - P^i(X|Z)$  (now without the prime) and we shall rewrite  $\text{rel}_X^{i'}(Y)$  to  $\text{rel}_{X|Z}^i(Y) =_{df} P^i(X|Y \wedge Z) - P^i(X|Z)$ . Using the compact

<sup>107</sup>How many of our English-speaking colleagues can tell the putative *duc de Paris* from the putative *comte de Paris*? The original role model for the duke is, of course, the king of Buganda, introduced into the debate by Gazdar (1979).

<sup>108</sup>For the import of this condition, see below and a demonstration following the proof of Proposition 2 in Appendix 1. See also Merin (1999:Th.6) for a bunch of theorems on the relative relevance of disjunction and conjunction which depend upon this assumption. Inductive semantics brings out distinctions which are conflated in its proper sub-theory of relevant deductive semantics.

<sup>109</sup>The same kind of argument as will be conducted presently will go through for  $\text{r}_H^i(S) =_{df} \log[P^i(S|H)/P^i(S|\neg H)]$ .

<sup>110</sup>The space of conditional probability functions is not closed under conditioning, as the celebrated trivialization results of Lewis (1976) pointed out. (Lewis' argument against the viability of a universal, freely embeddable probability conditional  $A > C$  such that  $\text{Prob}(A > C) =_{df} P(C|A)$  can be read as an exercise in imagined violation of the discursive relevance requirement. A crucial step involves instantiations  $\text{Prob}(A > C|C) = P(C|A \wedge C) \equiv 1$  and  $\text{Prob}(A > C|\neg C) = P(C|A \wedge \neg C) \equiv 0$ .) But our conditions of use and present application skirt around trivialization. See Merin (2002a) for some observations on embedded conditionals.

notation of  $AB$  for  $A \wedge B$ , we set  $\text{rel}_{H|\Theta}^i(S) =_{df} P^i(H|S\Theta) - P^i(H|\Theta)$ . Analogously,  $r_{H|\Theta}^i(S) =_{df} \log[P^i(S|H\Theta)/P^i(S|\neg H\Theta)]$  will define amount of relevance conditional on  $\Theta$  in terms of the log-likelihood-ratio function. These quantitative concepts will measure the relevance of  $S$  to  $H$  after we have conditioned on  $\Theta$ , say by accommodating it.

Provably, if a proposition  $R$  entails  $\Theta$ , then, whatever the issue  $H$ , if  $\Theta$  is uncontroversial w.r.t.  $H$  i.e.  $(\Theta \perp_i H)$ , then accommodating  $\Theta$  will not change the relevance of  $R$  to  $H$ :

PROPOSITION 1: If  $R$  entails  $\Theta$  and  $(H \perp_i \Theta)$ , then  $\text{rel}_{H|\Theta}^i(R) = \text{rel}_H^i(R)$ .<sup>111</sup>

From our examples, it seems clear enough that  $R$  ('The duke of Paris is bald' does entail (indeed properly and non-vacuously)  $\Theta$  ('There exists a duke of Paris'). So each-way properly accommodating the existence of the duke of Paris ( $\Theta$ ) when we assert that the duke of Paris is bald ( $R$ ) will not affect relevance of our assertion to the issue of sales prospects for pate polish. However, things change when we assert  $S$  ('The duke of Paris is not bald'), understood as the propositional negation  $\neg R$  of  $R$ .

PROPOSITION 2: If (i)  $\neg S$  entails  $\Theta$  and (ii)  $0 < P^i(S), P^i(S\Theta), P^i(S\neg\Theta) < 1$  and (iii)  $(\Theta \perp_i H)$ , then  $\text{rel}_{H|\Theta}^i(S) = k \cdot \text{rel}_H^i(S)$  for some real number  $k > 1$ .<sup>112</sup>

In words: Accommodation of a symmetrically uncontroversial  $\Theta$ , nonvacuously and properly entailed by the negation  $\neg S$  of an assertion  $S$ , makes positively relevant  $S$  yet more positively relevant, and negatively relevant  $S$  yet more negatively relevant.<sup>113</sup>

<sup>111</sup>*Proof:*  $R \models \Theta$  means  $R = R\Theta$  (i.e.  $R \wedge \Theta$ );  $(H \perp_i \Theta)$  means  $P(H) = P(H|\Theta)$ . Thus,  $P(H|R) - P(H) = P(H|R\Theta) - P(H|\Theta)$ .  $\square$  For reading practice, here is a demonstration of the equivalent PROPOSITION 1', for the 'r' measure. *Proof:*  $r_{H|\Theta}^i(R) =_{df} \log[P^i(R|H\Theta)/P^i(R|\neg H\Theta)]$ . Since log is strictly monotone increasing, we go straight to Bayes factors. Recall assumptions  $R\Theta = R$  and  $(H \perp_i \Theta)$ . The latter holds iff  $P(H\Theta) = P(H)P(\Theta)$ . Now,  

$$\begin{aligned} & P^i(R|H\Theta)/P^i(R|\neg H\Theta) = \\ & = [P^i(HR\Theta)/P(H\Theta)]/[P^i(\neg HR\Theta)/P(\neg H\Theta)] \\ & = [P^i(HR)/P(H\Theta)]/[P^i(\neg HR)/P(\neg H\Theta)] \\ & = [P^i(HR)/P(H)P(\Theta)]/[P^i(\neg HR)/P(\neg H)P(\Theta)] \\ & = P^i(R|H)/P^i(R|\neg H), \text{ of which the logarithm is } r_H^i(R). \quad \square \end{aligned}$$

<sup>112</sup>Proof at the end of Appendix 1. Condition (ii) conjoined with (i) says that our basic assertible and accommodable propositions  $S, \Theta$  are  $i$ -contingent, and that entailment of  $\Theta$  by  $\neg S$  is proper and reflected as such in its doxastic status, i.e. in  $\neg S \pi \models_i \Theta$ , which, given the  $i$ -contingency of  $\Theta$ , amounts to  $\neg S \frac{\rho}{\pi} \models_i \Theta$ .

<sup>113</sup>See Appendix 1 for a demonstration that conditions (i), (ii) and (iii) rule out any

So, in a state of doubt concerning the existence of a duke of Paris, accommodating the existence of a duke of Paris makes our assertoric utterance of *The duke of Paris is not bald* more negatively relevant to sales prospects of pate polish than it presumably would be if his existence was still in doubt.<sup>114</sup>

The each-way properly ‘accommodated’ reading, corresponding to Russell’s narrow negation scope construal and to Heim’s (1983) ‘global accommodation’ is more relevant than the unaccommodated reading, which corresponds to Russell’s wide negation-scope and to Heim’s putative ‘local accommodation’ reading. (I do not in fact believe there is such a thing as local accommodation.) What Proposition 2 makes conceivable is a novel reason for the robustly observed dispreference for Russell’s wide negation-scope reading, a reading allegedly associated with ‘local accommodation’. The reason would be the suboptimal relevance of the proposition corresponding to this reading.

Where  $(\Theta \perp_i H)$  does not hold, countermodels bar useful generalizations when  $\text{sgn}[\text{rel}_H^i(\Theta)] = -\text{sgn}[\text{rel}_H^i(S)]$  which would correspond to the case where a shortsighted Addressee would be only too happy to accommodate  $\Theta$ . So the symmetric case of each-way proper accommodation has a distinguished position in our language game. The immediate effects of accommodation on ostensible participant interests focussed on the issue are perfectly evenhanded. Recalling the ‘veil of ignorance’ symmetrizing device and the inverse interest structure that attaches to claims and concessions respectively, we can characterize each-way proper accommodation of  $\Theta$  as follows: it is, as regards the immediate relation of  $\Theta$  to the issue  $H$  invariant under permutations of the interest structure with regard to  $H$ .

Increased relevance under the conditions stated is not the only distinctive property of the narrow negation-scope reading. Obviously, the reading is logically stronger than the ‘unaccommodated’, wide-scope reading<sup>115</sup> So here increased relevance (which is directional) and increased informativeness defined by logical strength (which is non-directional) would be concomitants. However, the relevance increase depends on assumptions which are not required for the informativeness increase.

The apriorist mental reflex action would be to consider this a disadvan-

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$H$  for or against which  $S$  is a conclusive argument in  $i$ . This would be the case when  $P^i(H|S) \in \{0, 1\}$ , i.e. when  $S \models_i H$  or  $S \models_i \neg H$ . See also Merin (1997b), which makes a case for its title based on an argument originally due to Zeno. In Appendix 1, I explain in some generality the formal reasons behind Proposition 2, and I also give a proof for the log-likelihood-ratio relevance function.

<sup>114</sup>Of course, if  $\neg\Theta$  were accommodated, it would, by assumption, already entail  $S$  and would therefore make the would-be assertion of  $S$  irrelevant to any proposition whatever.

<sup>115</sup>To be distinguished from one where the duke’s non-existence has been accommodated, which would, however, make  $S$  irrelevant to any  $H$  whatever.

tage. But the spirit of experience, which looks at nature and human nature as a puzzle, would ask with George Polya (1944): ‘Have you used all the data?’ And the answer might well be that these data correspond to formal properties including the one that explicates the uncontroversiality condition on proper accommodables, or to empirical observations which tell us that few of our daily arguments are deductively conclusive.

But is  $\Theta$  not intuitively controversial after all, if it increases the relevance of  $S$  to  $H$ ?<sup>116</sup> Not so to an addressee who is conventionally shortsighted enough.<sup>117</sup> Indeed, the speaker displays, as La Rochefoucauld might have said, a certain *esprit de finesse*, which is here predicated on the short sight of the hearer.<sup>118</sup> Recall from above that, when  $i$ -contingent  $\neg S$  entails  $i$ -contingent  $\Theta$ ,  $S$  and  $\Theta$  are negatively relevant to one another in  $i$ . Thus,  $r_S^i(\Theta) < 0$ , and, with respect to arguing for  $S$ , the speaker is conceding the addressee an advantage after all, namely with respect to establishing  $S$ . But he can do so tranquilly if he has conclusive backing for  $S$ ; and the implicit request for accommodation of  $\Theta$  is indeed a sign of confidence in the assertion  $S$ .

Moreover, the speaker can exploit the negative relevance of  $S$  and  $\Theta$  to one another, by having it facilitate the imputation of responsibility for  $\Theta$  to the addressee. Recall the principle we have elicited: the origin of presuppositions is identified as far as possible with the addressee. The idea, then, is this: the addressee who accommodates us in going some place does so because he really wanted to be there all along. His ‘*sollen*’ (‘ought’), to give Kant’s formula of 1785 describing the autonomous agent the treatment of Orwellian travesty, is really his ‘*wollen*’ (‘wish-and-will’). Or so the speaker would have him feel and act like.

Another instance of the pattern of imputing a constraint to the addressee might indeed be the uniqueness condition on definite descriptions.<sup>119</sup> We have seen a slightly facetious dialogue example above, in which uniqueness was asserted (by the second speaker, Beta) and in which existence was (asserted by Alpha and thence, and in this sense) presupposed by Beta. If our suspension test is anything to go by, there is much to be said for privileging an act-allocation in which the uniqueness intimation of a full definite description sentence *The king of France is (not) bald* or *The national pas-*

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<sup>116</sup>I examine the associated debate in forthcoming work based on ESSLLI lecture courses on relevance.

<sup>117</sup>Conventions, however established or introspectible, explain our intuitions of meaning, the data of philosophical logic.

<sup>118</sup>The self-cognizant speaker also has a head-start with respect to the hearer in  $c$ -time.

<sup>119</sup>This is not in contradiction with a similar claim for the existence presupposition. First, there is no logical contradiction. Secondly, the two constraints will usually become important in different contexts of use, if they become important at all.

*time of Arcadia is (not) educational* is classed, in e-time structure, as an assertoric contribution originating with the speaker, call him Beta. The literature (Gazdar 1979) remarks routinely that uniqueness, once a domain is given, is neither deniable nor even readily suspendible. The metaphysics of conduct running under e-time allows us to reconcile its status as a presupposition relative to Beta's assertion  $\pm$ *bald*, which is transacted at  $j$ , with the demand that it be, likewise, an assertion of Beta's.

If we model our discourse components by minimal turns, identified with the accretion of Russell-style clause components (as pictured in DRT), then we could have existence of a king asserted by Alpha at  $j-1$  and uniqueness of any such king asserted by Beta at  $j-2$ . So uniqueness would already be common ground at  $j-1$ , existence would be common ground as well at  $j$ , which is the assertoric present. As far as the presuppositions go, Alpha would be a kind of lounge Existentialist while Beta would be a kind of lounge Nihilist.<sup>120</sup> It seems a bit counterintuitive to let the Nihilist begin, but in other forthcoming work I have explored the relation between intuitions of existence generally projected upon the topic position NP and the nature of the intuitively assertoric predicate part.<sup>121</sup>

The tactical interplay of Nihilism and Existentialism can also be observed at the macroscopic level of discourse. Here our example domain might be the topic-comment format of academic literature. The topic at large is represented by 'the references and their contents', i.e. by the literature. The comment at large is what the author or the reader make of it. In such a situation, a reader who wants time left over for leisure and family activities will be only too ready to demand, in kataphoric advance: 'and this will be all (the literature) there is'. This demand will be a condition on granting consideration to what the author will presuppose as existent and is an instance of a conditional non-existence presupposition.

A serious-looking bibliography presupposes the non-existence of any relevant literature other than that whose existence is noted. The presupposition grows stronger, the larger the bibliography gets. (And this identifies it as a probabilistic presupposition.) I should not, of course argue that our

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<sup>120</sup>There is some resemblance to Ehrenfeucht-Fraïssé Game proof techniques in model theory (cf. Hodges 1985). Think of Beta caring only about being able to pay the (evidential) bill, given that he wants to predicate his 'comment' predicate, and of Alpha caring only about seeing Beta out of pocket. The larger the domain of which the comment is predicated, the better *a priori* the chances of falsification. More directly, the idea is one extended explication of the 'polyphonic' approach to utterance meaning which had been informally proposed in Ducrot (1969) and in earlier literary theory, but which never developed much further.

<sup>121</sup>Compare '*The duke of Paris is bald—if indeed there is a duke of Paris*' and '*The duke of Paris is tall—if indeed there is a duke of Paris*'.

labour-saving disposition is all there is to this presupposition. One might alternatively motivate the presupposition by recourse to one's favourite subset of H.P. Grice's Conversational Maxims. But neither should I underestimate the contribution which the disposition makes to smooth acceptance of the non-existence presumption. Here the ostensible interest structure as regards expansion and contraction of the topic extension does not *a priori* extend to any other issue, say the issue of the comment. The comment is typically the author's contribution, to be defended against a reader whose professional duty it is to be skeptical. But *a posteriori*, the pragmatist will readily imagine cases where expansion of the literature, in flagrant contravention of the reader's Nihilist yearning for topic economy, would reduce net assertoric content drastically. Only the reader who feels that no hot news is good news will, in such cases, be grateful to the topic expansionist.

But expand we must, and the general theoretical claim about probabilistic presuppositions will, next, be applied to an argument against Gazdar's neo-positivist denial of presuppositional anteriority and to the presuppositions so-called that appear to be specific to Wh-questions.



## 10. Markov Properties of Discourse and Ducrot Chains

The neutrality or non-positivity of accommodables with respect to the protentive meaning of an utterance might be called an instance of ‘demand’ side neutrality. Someone who makes an assertion should not increase his demands with respect to the proposition at issue by having his presupposition accommodated. But in Section 1 we also characterized accommodation by its distinctive ‘supply’ side property, namely that it need not be argued for. Our characterization of presupposition in terms of relevance properties now allows us to appreciate the import of a phenomenon which turns out to reflect this idea (once you know what the idea is). In these phenomena, the neutrality of presupposition with respect to arguments supporting an assertion comes to the fore.

Ducrot (1968a:47, 1972) noted that subordinating conjunctions such as *because* (*parce que*) and *since* (*puisque*) bear only on the asserted component of an utterance, not the presupposition. He called this regularity ‘*règle d’enchaînement*’, i.e. ‘linking rule’ or, more agreeably to voice and ear, ‘chaining rule’. Here is a single sentence example of what, in honour of its discoverer, might be called a *Ducrot Chain*:

(19) It’s you who’ll go, because you’ve got a car.<sup>122</sup>

The presupposition of the cleft clause, as standardly assumed, is

(20) Someone will go.      [Θ]

It is intuitively clear that the speaker of (1) is giving

(21) You’ve got a car      [B]

as a reason not for (2), but for something paraphraseable by

(22) Granted that someone will go, you rather than someone else will go.  
[A]

The reason given bears only on the un presupposed part, as a denial would. The chaining rule—we might call it the ‘Ducrot Chain criterion’—was a great discovery in the empirical study of presupposition, though it remained as unexplored in the world at large as Ducrot’s work as a whole remained unreported outside the Romance-speaking world.

Its first significant implication is the evidence it provides for the view—rejected on methodological grounds by Gazdar—that presuppositions are ostensibly commitments which are temporally prior to assertions in the sense

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<sup>122</sup>See Appendix 2 for Atlas & Levinson’s logical form of clefts.

of being ostensibly entailed by the context. If a presupposition is already part of context, it need no longer be argued for. (And, as we shall recall in a moment, it can no longer be argued for, in a strict technical sense.) Ducrot’s observation, given lawlike status in the Ducrot Chain criterion, is predicted by the assumption of prior acceptance, and therefore lends it inductive support.

To explore the observation further, note an abstract property which the Ducrot Chain criterion imposes on assertoric discourse, to the extent (cf. Ducrot 1972) that it holds up empirically.

Argumentative discourse can be ideally seen as a chain of reasons given: reasons for, in single-minded but addressed monologue; and reasons for and against in dialogue or dialectical monologue. The chaining rule reflects an empirical discovery: that such discourse ostensibly has the *Markov property* (Doob 1953; Jeffrey 1992). This means that current expectations (of which probabilities are a special case) are screened by the current context  $j$  of presuppositions from all earlier contexts  $j-k$ . I.e. for a given random variable  $X$  with conditional expectation function  $E(X|\cdot)$ , the Markov property implies that  $E(X|j, j-1, \dots, j-k) = E(X|j)$ .<sup>123</sup> The special case we have been engaging here is  $P^{j+1}(A|j, j-1, \dots, j-k) = P^{j+1}(A|j)$  for any proposition  $A$ . Dynamic argumentative dependence should be modular in reaching only back one stage of information accretion. The presuppositional present screens the argumentative past from detraction as much as from the need for support.

When we deny a presupposition  $\Theta$ , we reach back into a past when  $\Theta$  was not yet a presupposition. But we do so sparingly. Ducrot (1968a,b, 1972) rightly emphasizes the violence of rejecting a presupposition, and offers a reason. A presupposition is presented as inconstestable, indeed as something that has been part of our lived-through experience (*‘comme un vécu’*). But what makes it so? The Bayesian has part of the answer ready.

Here is the bare definitional sub-part of it. If a proposition  $\Theta$  has become a context-presupposition of context  $j$ , it has unit probability there:  $P^j(\Theta) = 1$ . This makes it unshakeable by conditioning on any other proposition. The formal reason is simple:  $P^j(\Theta|X) =_{df} P^j(\Theta \wedge X)/P(X)$  for any  $X$  and  $j$ . If  $P^j(\Theta) = 1$ , then  $P^j(\Theta|X) = P^j(X)/P^j(X) = 1 = P^j(\Theta)$  when  $P^j(X) > 0$ , else undefined. Conditioning on  $\neg\Theta$ , a special case, would make  $P^j$  undefined and so is not admitted. Updates are monotone in this sense.

Now comes the motivating sub-part of the answer. Recall that  $\Theta$  will also be evidentially irrelevant to any proposition at  $j$  or any context derived from  $j$  by conditioning. Yet often we do have intuitions of relevance.

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<sup>123</sup>Where the commata stand for conjunction and the conjuncts for complete state specifications, i.e. propositions laying down probability constraints.

They come from a real or imaginary past  $j-k$  (the latter kind being a counterfactual state) when  $\Theta$  was not yet a presupposition. Now, in becoming a presupposition by being conditioned on at, say,  $j-3$ ,  $\Theta$  has spent all the relevance it ever had to any proposition in the domain of the representative probability function  $P^{j-4}$  which represents the preceding context  $j-4$ . It has wrought changes on  $P^{j-4}$ , transforming it into  $P^{j-4}(\cdot|\Theta) = P^{j-3}(\cdot)$ , which have affected the probabilities it assigns to all those propositions in its domain to which  $\Theta$  had in any way been relevant. The influence of  $\Theta$  has spread, to the extent that it had any, and to the extent that the speakers approximate ideal Bayesians. Ideal Bayesians learn their lessons of experience by integrating it with their knowledge. To undo what is learnt is usually difficult and expensive (Skyrms 1983).<sup>124</sup> The difficulty constitutes one reason for retaining presuppositions; and may thus be one reason, too, for people getting so upset—indeed angry—when their presuppositions are being questioned.<sup>125</sup>

To explore how far a Markov principle for reasons given holds up across a wide range of data would be a lengthy research effort. But even when we confine our attention to Ducrot's shiny example of the car, is his description of it indeed a correct rendering of what goes on? And if not, is there a reason for this in our notion of presupposition?

Intuitively, Ducrot's description will stand up. Your having a car is not the reason that someone who is no-one in particular will come. It is a reason for *you* coming. We can, moreover, take for granted that *because* and *since* each express the relationship of being a reason (perhaps amongst other things). And we subsume the notion of a cause under this pre-theoretical notion.

Next, and now in a DTS, we explicate the relationship of being a reason.

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<sup>124</sup>In considering reversibility, we can distinguish conditioning on  $\Theta$ , which makes  $\Theta$  a deterministic presupposition and gives  $\neg\Theta$  zero probability, from *generalized conditioning* (Jeffrey 1965) on the partition  $\{\Theta, \neg\Theta\}$  which, moving in the same direction, merely reduces the probability of  $\Theta$  to some non-zero amount  $\alpha$ , so  $\Theta$ , or rather the nondegenerate constraint  $P(\Theta) = \alpha$ , is a properly probabilistic presupposition. (Interval constraints might do, too.) The two update regimes have in common 'rigidity', namely  $P(X|\Phi)/P(Y|\Phi) = P'(X|\Phi)/P'(Y|\Phi)$  for  $\Phi = \Theta, \neg\Theta$  where  $P$  and  $P'$  are the old and new probability functions, respectively, such that  $P(\Theta) < P'(\Theta)$ . Now, as long as  $P'(\Phi) \neq 0$  holds, we can always return to the earlier assignment for its domain of rigidity by multiplying with a scalar factor. Proportions are respected, as long as there are proportions to respect. Attempts to divide by zero would not preserve any such proportion.

<sup>125</sup>Another reason, perhaps supervenient on this one, is that their honour is being impugned. Imagine someone rejecting your polite request that they step aside for just a moment. Or imagine being accused, as you are half-way to the till and exit, of pretending that an expensive item from the rare books section which you are carrying was from the free give-away heap of remaindered Harry Potter.

We do so by positive evidential relevance and we explicate being presupposed at a context  $j$  by having unit probability at  $j$ . But if a proposition  $\Theta$  (say (20)) is presupposed at  $j$ , no proposition can be relevant to it *at*  $j$ . By contrast, if a proposition  $A$  is asserted at  $j$  (and is therefore not just a reminder), it must be contingent at  $j$ . It will be a presupposition at the earliest at  $j + 1$ , if ever. Thus, if a proposition  $B$  is offered as a reason for  $A$  and indeed asserted at  $j$  it *can* be relevant to  $A$  at  $j$ . In our example,  $B$  (= (21)) is presented as being positively relevant to  $A$  (= (22)) and intuitively to a significant degree. What makes for particularly high relevance is the intimation that others do not have a car. This is the context of justification. The psychological context of discovery, of course, has us working in reverse. The intimation is induced by the requirement that (21) be significantly relevant to (22). The account will generalize nicely to a two-sentence discourse version of (19), i.e.

(23) It's you who'll go. You've got a car.

Here the introspectible sequence is that  $\Theta$  is presupposed,  $A$  is being asserted, though with some expectation that it will not be accepted as a constraint without a debate. For this reason,  $B$  is then asserted, too. Its acceptance can hardly be refused under the likely circumstances of utterance. Acceptance of  $B$ , in turn, drives up the probability of  $A$ . This observation is indeed an uncomplicated way of putting things when we take the predictive reading for  $A$  at face value.

A concomitant sequence of transformations in e-time impose themselves. First,  $\Theta$  is accommodated.  $\Theta$  is *ceteris paribus* fairly uncontroversial, and the more so the larger the domain of quantification. Then  $B$  is taken on board, and again we might say it can be taken for granted, but now for a different reason: in ordinary contexts of use, it will be undeniable. Since we cannot claim that your having a car and someone going are already *a priori* sufficient for your going, we should say that  $A$  is asserted, and that its already high probability will make acceptance easier and will thus make ratification of the assertion more likely.<sup>126</sup>

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<sup>126</sup>Many acceptance regimes are conceivable. The one I go for *ceteris paribus* (cf. Merin 1994b) is in essence the Neyman-Pearson-Wald analysis of sequential decisionmaking (Wald 1947). You, the decision-maker, set probability thresholds for acceptance of  $A$  and rejection of  $A$ , (i.e. acceptance of  $\neg A$ ), on the basis of disutilities attaching to unwarranted acceptance and unwarranted rejection of  $A$ . You then pile on information (e.g. assertions  $E_i$  you accept) until such time as  $P(A)$  crosses either threshold. The impact of these  $E_i$  on  $P(A)$  is measured by appropriate relevance functions. If the  $E_i$  are conditionally independent on each of  $A$  and  $\neg A$ , relevance is strictly compositional, i.e. additive or multiplicative.

But what shall we make of the widely received judgment that the explanans clause  $B$  of a sentence like (1) is itself presupposed? Since Frege (1892), if not already before him, it has been accepted that a clause subordinated by *since* is presupposed.<sup>127</sup> This assumption has also been extended to *because*. Suppose this judgment were correct. Then we should say that  $B$  (i.e. (21)), in being presupposed at  $j$ , cannot be relevant to  $A$  (i.e. (22)) at  $j$ , since all its relevance, if any it ever had, has already been spent. But I think we have no problem here: ‘*because*’ does not mark its complement as presupposed. For suppose we subject the relatively uncomplicated

(24) Lee can go, {a. since / b. because} she’s got a car.

to the test operations of interrogation and of periphrastic, hopefully wide-scope negation:

(25) It is not the case that Lee can {a. go, since / b. go because} she’s got a car.

(26) Can Lee go, {a. since / b. because} she’s got a car?

In (25a), Lee’s having a car is a reason for her not going. We cannot omit the comma, nor continue by specifying that she has no car. By contrast, (25b) admits such a continuation quite readily. In (26) reasonhood is questioned, but only (26a) preserves Lee’s possession of a car as undeniable. So we are nearly home and dry with our original example, (19).

For versions with *since* we are not. However, there are all sorts of solution proposals. One of them is the following, in line with the stochastic process notion introduced above. We ostensibly replace the probability function  $P$  defined on an algebra  $\mathcal{F}$  by a function  $P'$  defined on a richer, ‘finer’ algebra  $\mathcal{F}'$ , such that  $P'$  extends  $P$ .<sup>128</sup>  $\mathcal{F}'$  contains the reason proposition  $B$  and its conjunctive compounds  $B \cap X$  ( $X \in \mathcal{F}'$ ), which were not elements of  $\mathcal{F}$ .

<sup>127</sup>Frege (1892:42n) is explicit only for properly temporal *after* (*nachdem*). It is not clear whether he would extend the claim to explanatory *since* and *because*. In his closest example (op.cit. p. 48), ‘{Since/because} ice has a lower specific weight than water, it floats on water’ he uses German *weil*, but in a manner felicitously paraphraseable by German *da* which translates explanatory *since* in such constructions. But he makes no actual claim of presupposing there.

<sup>128</sup>A function  $g$  extends a function  $f$  iff  $g(a) = f(a)$  for all arguments  $a$  of  $f$ , and it properly extends  $f$  if it is also defined for arguments not in the domain of  $f$ . The domain of  $P'$  is a proper extension of the domain of  $P$ . Toy example:  $\mathcal{F}$  the algebra generated by  $\{A\}$ , i.e. having elements  $\{\Omega, \emptyset, A, \neg A\}$ , and  $\mathcal{F}'$  the algebra generated by  $\{A, B\}$ , which contains  $\mathcal{F}$  as a sub-algebra. Whatever probability mass we give to elements  $A \wedge B$ ,  $A \wedge \neg B$ ,  $B \wedge \neg A$ , and  $\neg A \wedge \neg B$  of  $\mathcal{F}'$ : if  $P'$  extends  $P$ , then  $P'(A) \equiv P(A \wedge B) + P(A \wedge \neg B)$  will equal  $P(A)$ .

Moreover, we demand that  $P'$  satisfy a constraint that  $B$  is highly, perhaps extremely, positive to  $A$ . The latter constraint will be  $P'(A) < P'(A|B) = 1$ , the former that  $\text{rel}_B(A) \gg 0$  for a suitable numerical relevance function  $\text{rel}$  and contextual interpretation of the ‘much-greater’ relation  $\gg$ . Now the addressee is being asked to accommodate this *refinement* of the Common Prior at a moment in e-time  $j-m$  prior to e-time  $j-k$  at which  $B$  is deemed to have become a certainty. The function  $P'$  becomes  $P^{j-m}$  and replaces  $P$ . It properly extends  $P$ , even though it introduces relevance relations not defined in  $P$ , namely all those involving  $B$ . It is only when we condition on  $B$  at the subsequent e-time moment  $j-k$  that the resulting function  $P^{j-k}$  no longer extends  $P$ , unless  $B$  is irrelevant to all other elements of the algebra.

The combined operation of accommodating a refinement and conditioning on an element of that refinement will not in general be proper accommodation. Accommodating the refinement by itself would be proper, for it leaves unchanged the probabilities assigned by the ostensible  $P$ -function which it replaces in the e-past. But subsequent e-historical updates on a proposition that is newly admitted as introducing a finer distinction into the algebra may well change the probability of a proposition at issue. In Ducrot’s example, this would surely be the proposition  $A$  (i.e. (22)).<sup>129</sup> Perhaps ‘retro-assertion’ might be a reasonable name for the composite act performed.<sup>130</sup> The presupposed proposition  $\Theta$ , distinct from  $B$ , will be deemed to be established at a context prior to  $j-m$ , just to be on the safe side.

This explanatory, discourse-connective interpretation of *since* preserves the essential semantic structure of the temporal connective as explicated by Kamp (1968). To recall it, let  $A, B$  be properties of moments  $t$  of time, so  $A(t)$  is true iff  $A$  is true at  $t$ . Let  $<$  designate linear temporal order, and  $t_*$  the present (time) point. Then properly temporal

(27) *(ever) since A (was the case), B (has been the case)*

translates to a formula  $S(A, B)$  whose meaning is given by

(28)  $S(A, B)$  is true iff  $\exists t[t < t_* \wedge A(t) \wedge \forall t'[(t < t' < t_*) \rightarrow B(t')]$ .

The original intended interpretation was c-time, but only contingently so. Applications of the logic in computer science, never mind the basic logic

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<sup>129</sup>We could think of a version of the discourse in which all that was uttered was ‘*You’ve got a car*’, the  $A$ -clause remaining tacit and therefore a prototypically implicit  $H$ .

<sup>130</sup>Landman (1986) contrasts assertoric uses of conditionals  $A > B$  with those which are (as I should put it) mere *reminders* that  $B$  follows from  $A$  in view of our database. What I propose here might be an explication. Assertion, or, more generally, establishment as common ground, of the conditional is deemed to have taken place in the e-past. See Appendix 2.

itself, implied that time could be conceived of more abstractly. Here we propose one of the possible models of time, namely e-time. To turn (28) into semantics for evidential *since*, we (a) specify time to e-time and (b) weaken the rightmost strict inequality to  $t' \leq t_*$  or else elide it. Modification (b) is required in view of our routine evidential interpretation of  $A(t)$  as  $P^t(A) = 1$ , which precludes its undoing by purely Bayesian means.

Let us return to the general case—or to the case of *because* if unsure about the proposal for *since*. One may still object that, if you will go, then, ipso facto, someone will go; and hence, if your having a car is positive to your going, it will ipso facto be positive to someone going.

The first observation is a truism, indeed a rule of inference, of predicate logic. The putative consequence, i.e. the objection, does not, however, follow in a DTS *ceteris paribus*, since it is not a theorem of probability calculus. A proposition  $K$  may be positively (though not extremely) relevant to a proposition  $L$  without being positive to a proposition  $M$  entailed by  $L$ . Hearing that Linda works in finance and subscribes to *Ms.* magazine may be positive to her being a feminist bank teller, but neutral to her being a bank teller. It is only when  $K$  is a conclusive, sufficient reason for  $L$ , (i.e. when  $P(L) < P(L|K) = 1$ ), that it must also be *sufficient* for  $M$ . However, even in this case it will be a sufficient *reason* for  $M$  only provided  $P(M) < 1$ .<sup>131</sup> But if, for some reason,  $M$  is already known, i.e. a certainty, then  $P(M|K) = 1$  will hold trivially, but  $P(M|K) > P(M)$  will not. It will be sufficient for  $M$ , but not a reason for  $M$ .

Returning to our initial example, it is only when  $B$  is a conclusive reason for  $A$  at  $j$ , (i.e. when  $P^j(A) < P^j(A|B) = 1$ ) and when, moreover,  $\Theta$  is not presupposed at  $j$ , that  $B$  must also be a reason for  $\Theta$ .

But suppose we now take seriously the judgment or putative intuition that  $B$  is positive to  $\Theta$ , though perhaps only to a small degree.<sup>132</sup> And suppose we assume that it is positive to it at  $j$ . In this case  $\Theta$  cannot be a deterministic presupposition at  $j$  after all. It will be a probabilistic presupposition: a mere *prejudice*.

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<sup>131</sup>Even then there are some measures of degree of relevance, e.g.  $P(H|E) - P(H)$ , which could make  $K$  much more positive to  $L$  than to  $M$ . By contrast, the log-likelihood function will make all sufficient reasons maximally, i.e. infinitely relevant, which seems very reasonable to a logician. It is an empirical question, much as it was for Carnap & Bar-Hillel (1952) with regard to their informativeness explicata *inf* and *cont*, which class of relevance function best explicates which class of philosophical (a.k.a. psychological) intuitions.

<sup>132</sup>Recall the note on different relevance measures.

## 11. Prejudices of Wh-Questions

There is considerable support for intuition and solution just mentioned in contexts where the cleft clause of (19) would be the answer to a minimally informed Wh-Question,

(29) Who will go?

This condition is engaged by a fairly familiar fact. The putative existential presuppositions specific to Wh-questions are defeasible, as Homer in effect pointed out.<sup>133</sup> In other work<sup>134</sup> I have explicated this prejudice by high probability for the prejudice, high but short of unit probability. If a cleft sentence is the full answer to a question such as (29), then its main presupposition here pertinent will be that of the cleft, i.e. (20). On the hypothesis to be preferred, there *is* ceteris paribus a small prior probability that nobody will be going. Your going will make that probability zero.

But why, then, *is* there such a large probability that *someone will* be going? One could plead anaphoricity, but then we should have to forego defeasibility. One could next plead high probability of anaphoricity. If so, we still want some kind of warrant in substantive terms, e-terms, not just a procedural probability derived from enumerative induction over discourses heard in the c-past.

And indeed, there is an e-motivation. Provided the domain of Wh-instances is not degenerately small, high probability is what (20) will receive under any prior probability distribution over the set of its complete possible answers which is not (as statisticians say) downright ‘kinky’. In particular, if the prior is ‘flat’, i.e. assigns equal probability to all possible complete answers, this will hold for any domain with at least two individuals. The two-individual case already yields four distinct complete possible answers and assigns (20) a probability of 0.75. As the number of individuals goes up, so does the probability of (20). Nothing like it holds for yes-no questions such as

(30) Will you go?

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<sup>133</sup>When demonstrating obliquely, in Book 9 of the *Odysee*, that ‘Nobody’ is a respectable answer to a *who*-question.

<sup>134</sup>A talk on presuppositions of questions given at IMS, University of Stuttgart July 1998, for helpful queries at which, if I remember right, I am indebted to Hans Kamp, Robert van Rooy, and T. Ede Zimmermann. Subsequent presentations were at the ESS-LLI Summer School, Utrecht August 1999, at Konstanz University shortly thereafter, and, under the title, ‘Presuppositions of Questions and Aesthetics of Data’, at the International Conference of the German Society for Analytic Philosophy, Bielefeld, October 2000.



(pronounced with default prosody) under the even prior assumption. Their relevant partition is always a bi-partition and so they have no corresponding existence presupposition. If you go, someone will go. If you don't, and if, as the question appears to suggest when pronounced with default prosody, there is no-one else being considered, then no-one will go.<sup>135</sup> At this point we have come full circle to the probabilistic presuppositions underlying questions. But this is a point where the familiar modal coarsenings of probability constraints, namely  $K(A) \leftrightarrow P(A) = 1$  and thence  $\neg K(A) \leftrightarrow P(A) < 1$  etc., do no longer provide means sufficient to explain our data.

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<sup>135</sup>But suppose we include in our reckoning the possibility of there being others that might conceivably go. Then there should be a probability bias towards someone going. But note now an observation, due to Anscombe & Ducrot (1983), that Yes-No-questions have a bias towards the negative answer. (I think this observation finds support both in the possibility of 'pointed' questions and in the pronounced opposite bias of negative questions, as distinct from questions with a negative predicate.) If so we have a countervailing bias and one may feel that it cancels an earlier bias regarding (20).

## 12. Solution of a Problem in Presupposition Projection

The ‘projection’ of presuppositions is the process by which the presuppositions that are commonly intuited as attaching to a sentence or clause  $S$ —when  $S$  is uttered unembedded—are retained by utterances of complex sentences of which  $S$  is a proper part. In a doctrinal framework that regards all presupposing as accommodation (e.g. Stalnaker 1974), to be projected is to be accommodated as common ground.

In some sentential and contextual environments, presuppositions are projected, in others they are not. A theory of projection must predict when, and explain why. On the first count, it should thus ideally do for presuppositions what a theory of assertoric recursion should do for truth- or warrant conditions as idealized in the simple languages of propositional and predicate logic.

An early example of presupposition non-projection is exhibited in Russell’s fancy that the King in the *The Tempest* might say ‘*If Ferdinand is not drowned, Ferdinand is my only son*’.<sup>136</sup> Here the intuitive presupposition attaching to ‘Ferdinand is my only son’, namely that its speaker has at least one son, which is diagnosed by its preservation under denial (‘*Ferdinand is not my only son*’), no longer holds. Even if Ferdinand is drowned, and there is no son left, the complex sentence will be true and also felicitous. By contrast, each of ‘*Ferdinand is my only son*’ and ‘*Ferdinand is not my only son*’ will be infelicitous under the assumption that there were no other sons and that Ferdinand is no more. The example is instructive not least because it falsifies any straightforward bound-anaphora theory of presupposition suspension in conditionals; unlike, say, ‘*If I have a son left, Ferdinand is my only son*’.

Approaches to projection come in two broad kinds (cf. Kadmon 2001: Ch. 6; Geurts 1999; Beaver 1997).<sup>137</sup> *Satisfaction/Filtering/Binding* approaches assume that a presupposition  $[psn] \pi(s)$  of a clause  $s$  fails to be inherited by a complex sentence  $\rho s \tau$  iff it is satisfied locally, i.e. in a suitable one of  $\rho, \tau$ . This idea, associated in significant parts with Karttunen

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<sup>136</sup>Russell (1905:[47]). Kripke (nd.) drew attention to this passage. Russell will have had in mind a padded version of the play, now lost, in which a sympathetic native of the Island inquires of the distraught foreign gentleman how many sons he has in all. If we emend ‘*only*’ to ‘*one and only*’, the sentence would fit more snugly into the play as handed down, but would lose its poignancy for presupposition theory. It would, however, still serve to make Russell’s point, which was to make plain the need for a theory which kept use of *the unique individual who is my son* meaningful without ontological inflation when there might be, in present fact, no such individual.

<sup>137</sup>In order of expository and financial accessibility. My sketch here is very rough; refer to these sources for a joint view of the state of the art. Appendix 2 picks on some of its persistent empirical shortcomings, exhibited in critiques of Gazdar.

(1974) and Stalnaker (1974), was further developed and motivated with a concomitant reduction of stipulation by Heim (1982, 1983). The dynamic, i.e. state-changing denotatum of, say,  $\rho$  which satisfies  $\pi(s)$  on this view contains a piece of information about the world which is required in any context in which  $s$  (or its nearest sentential correlate,  $S$ ) is felicitous, i.e. denotes an update function of the information context. A variant of this general approach is the generalized anaphoricity theory of presupposition proposed in van der Sandt (1992), in which satisfaction is explicitly likened to anaphora resolution. Local links take precedence over global, deictic links, just as they do in anaphora in the absence of obviation.

Heim's theory had been the first to distinguish 'global' accommodation (when local satisfaction was not guaranteed) from putative 'local' accommodation (when such satisfaction was not forthcoming), thence to model phenomena which Russell handled by means of relative scoping of negation. (Heim's 'local' accommodation, recall, corresponds to widest scope of negation.) A preference for global over local accommodation was hypothesized to explain the poor intuitability and acceptability of a 'wide scope' reading. A variant of van der Sandt's approach is due to Geurts (1999) who contrasts his essentially representational 'binding' [B] approach with the 'satisfaction' [S] approach, notably championed by Heim. [S], says Geurts, expects there to be information in the right context, [B] expects a syntactic object in an accessible discourse representation.<sup>138</sup>

But, for all the finesse of Geurts' phenomenology (and that of similar DRT-based, representational approaches) and for all the critical incisiveness Geurts applies to the currently prevailing Satisfaction account, such mentalism is austere non-explanatory. I believe it is a means of last resort, to be espoused locally when no theory which is more closely anchored in meaning and (rationally reconstructed) use will save the phenomena. Its promotion to equal if not preferred standing will surely have to be contingent upon its foundation in an independently motivated, formally intelligible theory of pure imagination. Such a theory would be of great importance for a variety of purposes, but it is not yet available.

*Blocking*, an approach taken by Gazdar (1979)<sup>139</sup> and generally re-

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<sup>138</sup> "In a sense, therefore, an expression like *Fred's wife* triggers different presuppositions according to the two theories: whereas for the [B]-theory it is that a woman must be given who is married to Fred, for the satisfaction theory it must be contextually given that Fred is married" (Geurts 1999:113). Since Fred's wife may be overseas, deceased, or entirely fictitious, this would make the [B] theory a doctrine of images or icons. If, as I for one suspect, propositions are not imaginable objects, there may be cause for a local division of labour between this theory and the one favoured here, which is a moderate extension of Gazdar's and about as far removed from the [B] theory as one can get.

<sup>139</sup> Also by van der Sandt (1988), as Beaver (1997) and Geurts (1999) recall. 'Blocking'

ferred to as a strategy of *Cancellation*, assumes, by contrast, that clauses *s* carry potential presuppositions [*ppsn*]s which are projected unless they are blocked (cancelled, suspended, filtered out).<sup>140</sup> They may be blocked by commitments that are already entailed by the prior context of utterance, by current assertoric content or else by ‘conversational implicatures’ of strings  $\rho s \tau$ .

Beaver (1997:5.3; 1999:28) rightly observed that Gazdar’s theory could be seen as a ‘structural theory of accommodation’. He did so in interpretation of a remark of Heim’s (1983), which said, roughly: ‘If one stipulates [as Heim herself does] a *ceteris paribus* preference for global over local accommodation, one recaptures the effect of Gazdar’s assumption that presupposition cancellation [which Heim treats as ‘local accommodation’] occurs only under threat of inconsistency.’

Gazdar did not intend his theory to be a theory of accommodation, if by the latter we understand a pretense of prior contextual entailment. But relative to the domain of lexicalized presupposition triggers, his requirement of consistent incrementability assumed that the context would accommodate the presupposition as a theory will accommodate any consistent extension. His blocking conditions would thus be constitutional constraints on accommodation.<sup>141</sup>

Gazdar offers a kinematic semantics for a propositional fragment of English. It views assertoric discourse as a process of consistent incrementation of epistemic contextual constraints, subject to the precedence hierarchy of speaker commitments.<sup>142</sup> First come antecedent contextual commitments.

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is what I propose for a label.

<sup>140</sup>‘Cancellation’ is the term that has stuck. Gazdar himself wished to speak indifferently of ‘cancellation’, ‘suspension’ or ‘filtering out’ (Gazdar 1979:133). However, he generally used ‘cancelling’, which is the best depiction of the *procedural* aspect of his account: an algorithm of hierarchical consistent incrementation, which amounts to a hierarchy of defaults and derogations. The *substantive* aspect of the approach hinges on the fact that cancelled ppsns are prevented from becoming part of the substantive epistemic commitments of the speaker, and therefore from being embodied in common ground. This is why I propose to call the approach one of *blocking*. Disembodiment does not imply disappearance. Ghosts can hover around in memory, their natural abode. They might be suspended in limbo or stuck to the inside of a filter membrane. They might still affect interpretive intuitions, even if they do not affect intuitions of binding commitment. So, while it seems reasonable to retain ‘cancellation’ on procedural grounds, one must not load it with phenomenological baggage which it is not made to carry.

<sup>141</sup>van der Sandt (1988) substitutes a phenomenological criterion, preservation of utterance acceptability, for Gazdar’s lexico-logical one of consistency. Examples 39 and 40 of Appendix 2 might seem to call for such a policy, but I think they can be discarded.

<sup>142</sup>Truth-conditions of representation sentences of form  $K(A)$  represent speaker commitments, those of plain  $A$ ,  $B$  extra-epistemic truth conditions. The two are linked by factivity of the modal  $K$  operator.

Next come truthconditional contents of what is being asserted (via a speaker's knowledge requirement of which Grice's Quality implicature is a partial weakening and partial extension). Then come potential Clausal quantity implicatures, e.g. that the assertor of *A or B* not know of either disjunct whether it holds or not. Then come potential Scalar implicatures (here: knowledge that not both do obtain). Finally come potential presuppositions, e.g. of existence for definite descriptions. Potentiality, which is lexically represented, turns into actuality when incrementation is consistent with prior incremented context as every increment has to be at any stage.

The hierarchy is the main stipulative element in the theory. Some of its pairwise orderings seem intuitive enough. Prior context should precede all contributions under a monotonicity requirement on evolution of commitments. It should do so a fortiori when it is to be given *realiter*, i.e. without appeal to the pretense of accommodation, which Gazdar eschews. Precedence of truth-conditional assertoric content,  $\zeta$ , is already harder to swallow for someone who takes the 'pre-' prefix in presupposition literally. But one might yet grant it logical (e-temporal) precedence on the assumption that the proximal objective of an assertoric utterance is to update the context so as to satisfy  $\zeta$ . Letting inconsistent ppsns of (sub-)clauses get in the way (if any there are) would be self-defeating.

The unreasonable aspect of the ordering for many if not most readers has been that presuppositions should be cancelled and thus preceded by conversational 'quantity' implicatures. On the doctrine of implicature (Grice 1989), the latter are inferences which ought to be computed at a later stage of discourse on the basis of what is asserted and presupposed.

This might still be countered in two ways. One way would be to say that 'generalized' conversational implicatures are lexical defaults which simply have the added virtue of being rationalizable by imputed observance of Maxims. This is the assumption made by Gazdar, who indeed adds an agnostic hedge on rationalizability. The other way might be to argue that projectible kinds of presuppositions, even those in taxa (i), (ii), and (iii) of Section 1, are themselves rationalizable conversational implicatures.<sup>143</sup> But implicatures are also readily deniable within the sentence (so their negations become common ground), while presuppositions are at best readily suspendible (neither they nor their negations necessarily become common ground).<sup>144</sup> Denying them is a violent move, though, to be fair to Gazdar,

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<sup>143</sup>Recall that this is what Strawson (1952) suggests for the existence psn of *all*, and what Atlas & Levinson (1981) proposed as a rationale for aspects of their logical form for *it*-cleft sentences. As far as I can see, the latter (see Appendix 2) turns out to be an instance of Russell's logical form for definite descriptions.

<sup>144</sup>See above on their denial. This is one reason why I prefer '*suspension*' to '*cancellation*'

would-be alternatives to his theory have tackled the task by introducing some of the least attractive constructs to be found in the theory of meaning.

One of these constructs is ‘metalinguistic negation’ (Horn 1985, after Ducrot (1972, 1973), and endorsed by Kadmon (2001). This is a joker in the explanatory deck of cards, apt to induce a reading of ‘formal’ in ‘formal pragmatics’ which has for synonym ‘formulaic’ rather than ‘unambiguously intelligible’ (see Merin 2003). The other construct, more circumspect, is Heim’s (1983) ‘local accommodation’, stipulated to be dispreferred to ‘global accommodation’, i.e. to accommodation (which for Heim is always of what I call the non-zero type). A typical application is the cancellation of a presupposition—here the word ‘cancellation’ is phenomenologically apt—by explicit denial (e.g. ‘because there *is* no rapid spin force!’), for which Gazdar uses precedence of assertion.<sup>145</sup>

The literature routinely cites ‘implicatures’ taking precedence over ‘presuppositions’ as a reason for rejecting Gazdar’s account. Sometimes this is the only reason given (Beaver 1997:965; Geurts 1999:65f.), sometimes there is additional support from claims of alleged empirical mispredictions (Kadmon 2001:137ff., Beaver 1999). In this section we show that the first reason is otiose. The crucial putative implicatures turn out to be presuppositions—probabilistic presuppositions—and in the narrow, prototypical sense defined by retention under flat denial and questioning.

Moreover, recent models of presupposition projection have nothing new to say about principles of implicature and, as we recall below, the principal alternative to Gazdar’s Blocking approach, the Satisfaction approach, has a problem which is still unresolved. So one cannot say that the problem is only of historical interest.<sup>146</sup>

Which approach can claim to be more ‘principled’ is a moot point. Clearly, ‘potential presuppositions’ are involved in all extant approaches. Use of the term need mean no more than that certain lexical items and their collocations are apt to expedite unquestioned ‘accommodation’ of psns when they occur in utterances. (If the psn is already in place, so much the better.) All theories of projection must specify the conditions under which

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as a label for Gazdar’s approach when psns are not replaced by assertions to the contrary.

<sup>145</sup>The subrelation ‘assertion beats presupposition’ is, I think, the weakest part of Gazdar’s theory. It does not explain the phenomenology of successful cancellation (notably the obligatory, peaked, exclamatory prosody in type (i) and many type (ii) cases) nor its failure with the uniqueness intimation of definites. But, as the drastic remedies of other approaches show, this seems to be a deep problem, and critiques of Gazdar go easy on this part of the precedence hierarchy, if they object at all.

<sup>146</sup>A fortiori so, if the currently mooted empirical counterexamples to Blocking turn out to be artefacts of thought experiment and interpretation.

accommodation does, in fact, occur.

However, a significant difference between the two approaches becomes apparent on considering both sides of presuppositional coinage. Presuppositions' pleasant side is that they are helpful in expediting discourse. Time is not to be wasted, and so things should be taken for granted. Presuppositions' unpleasant side is their being liable to undermine the guarantee of due process which informs traditional rules of evidence and, I believe, of language.<sup>147</sup> Seen from this side, presuppositions are potentially dangerous invaders, ready to pervert the course of accountable conduct.

Against the background of this side—a side which is rather less notorious today than it used to be when the delights of Sophistry rather than the joys of efficient information transfer were a household topic of conversation—we can classify approaches to projection. We do so according to the tactics they employ for rendering potential presuppositions harmless wherever possible. The distinction is simple enough. Satisfaction and binding throw them a morsel; suspension straps on a muzzle.

The first approach sounds definitely friendlier, but given the fundamental identity between the probabilistic presuppositions that cancel ppsns (or rather: block their accommodation) and those which define open questions, the second approach makes up in consequential, sometimes unobvious depth. If the first approach is one of *presupposition resolution*, the second approach might be called one of *presupposition justification*.

The two approaches indeed reflect two philosophical ideologies of logic. The first ideology sees logic as a tool for inference, ever expanding our implicit knowledge in attacking the white spots of culpable ignorance. It sees inferential chains of thought chaining forward from what we have established, and every so often breaking out of this routine to chain backward from bold conjectures.

The second ideology sees logic as a defensive weapon, designed to spot contradiction and, by the construction of countermodels, non-sequitur. Both ideologies have their respective places and merits. Their respective affinities to the inference rules of modus ponens and modus tollens, each of them finding employment in daily inferential practice, already shows that they can be turned to one and the same use. The popular methods of proof by means of Beth trees or Robinson's resolution algorithm are indeed shining examples of the home truth that a ministry of defence is, more often than not, a ministry of attack—attack for acquisitive purposes.

But only the defensive ideology makes intuitive sense of having, as a theorem, '*ex falso quodlibet*'—which *is* a theorem of our two standard working logics, classical and intuitionistic. The rule originally served, and serves,

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<sup>147</sup>Verbal language and signed languages of the deaf; not pic-bytes.

to have your opponent commit himself to whatever you might wish to see him committed to in your least charitable dreams. It is a means for making him abandon the attempt to impose his self-contradictory convictions on you, which his implicit demand that they become a context-presupposition amounts to. The idea of presupposition justification is in a similar spirit. Its object is to stop yourself, as much as anyone else, from imposing without seeming to, i.e. in expecting accommodation.

Kadmon defends Soames' (1982) suggestion that both types of presupposition containment mechanisms, Satisfaction (a.k.a. Filtering) and Blocking (a.k.a. Cancellation), are needed to account for the data which reflect the workings of the presuppositional part of the mind. In Appendix 2, I show that there are no grounds for assuming so. Here, I will begin with a standard example that shows cancellation/blocking successful and is held to show filtering/satisfaction at no disadvantage either:

(31) If someone has solved the problem, it is Julia who [has] solved it.<sup>148</sup>

Blocking will predict that the unopposed ppsn  $\pi(A_{31})$  'there is a problem' of the antecedent  $A_{31}$  'Someone [has] solved the problem' is projected, but that a Clausal implicature of speaker's uncertainty about  $A_{31}$ , which attaches to (31) in virtue of its being a conditional, suspends the ppsn  $\pi(C_{31})$ , that someone has solved the problem. of the cleft consequent  $C_{31}$ . Specifically, since  $\pi(C_{31}) = A_{31}$ , the Clausal  $\neg K(A_{31})$ , which takes precedence over the ppsn  $K(A_{31})$ , thereby blocks projection of  $\pi(C_{31})$ . This correlates well with the primary intuition that (31) does not presuppose that anyone solved the problem.

Satisfaction (a.k.a. Filtering) will claim that (31), being a conditional, carries a psn  $\pi(A_{31}) \wedge (A_{31} \rightarrow \pi(C_{31}))$ , i.e. that there exists a problem and that the antecedent materially implies the psn of the consequent. The theoretical motivation for material implication is apparent in its periphrase (cf. Heim 1983), 'those presuppositions of  $C$  which do not already follow from  $A$ '. One should not wish to disagree with this diagnosis of orderly information expansion on *a priori* grounds.

In the above case, where Gazdar predicts suspension, the presupposition will be the tautology, roughly: 'if someone solved the problem, someone solved the problem' or rather: 'if someone solved the problem, that someone solved the problem'. Since we know that, modulo  $\pi(A)$ , this is the trivial presupposition  $\Omega$ , the prediction comes to the same thing.

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<sup>148</sup>After Kadmon (2001:137) ex. (7a) and (2). My suggested insert in square brackets. Alignment of tense is not always perfect in example constructions found in the literature. Check whether it does make a noticeable difference in your dialect.



In cases where Gazdar predicts retention of the consequent presupposition, the material implication will not be a triviality. Consider, for background

(32) If Taiphoon Dee hits the coast, the beachcombers will lose their shirts.

(33) If I go to bed with her, Kim's children get jealous.<sup>149</sup>

The consequent's presupposition that the beachcombers have shirts to lose or keep (or that Kim has children) is retained by Gazdar. Under Satisfaction, it is attenuated to being conditional on the antecedent. This appears at odds with intuitions. Still, we must discount irrelevant intuitions of relevance and causation attaching to 'if'. The putative presupposition is not asserted, and, hence, no such intuitions ought to accrete to the material conditional. In (32) and (33),  $A$  and  $\pi(C)$  are causally independent, in view of world knowledge, which ought to nip in the bud any such intuitions.

So the only problem with the Satisfactionist presupposition will be that it is satisfied whenever the antecedent is false. A long debate has raged on whether  $\neg(A \wedge \neg\pi(C))$  (as I would write the Satisfaction prediction for minimal confusability) is projected. The straightforward argument has been KPs, namely that given 'truth-functional' (i.e. non-connectionist) grounds for asserting the conditional, ruling out that  $A$  is false, leaves  $C$  as the presupposition, which is what is intuited. But ruling out that  $A$  is false is what Gazdar's Clausal amounts to, whatever its genesis. So Satisfaction appears parasitic on Blocking.

I believe the argument can be clarified within a doxastic DTS. Consider J.L. Austin's unconditional conditionals  $A > C$  ('*If you want peanuts, there are some on the sideboard*'). The causal independence of clauses, reflected in doxastic independence, and a theory of Confident assertion of conditionals imply the familiar intuition that  $C$  is asserted outright (Merin 2002a, in press). Formally:  $P^i(C|A) = P^i(C)$  ( $i = j, j + 1$ ) and  $P^{j+1}(C|A) = 1$  imply  $P^{j+1}(C) = 1$ . In the quietly presuppositional case, we proceed analogously. If  $P^j(A \rightarrow \pi(C)) = 1$ , then  $P^j(\pi(C)|A) = 1$  provided  $P^j(A) > 0$ . By independence, i.e.  $P^j(\pi(C)|A) = P^j(\pi(C))$ , we obtain  $P^j(\pi(C)) = 1$ . Note that  $P^j(A) > 0$  amounts to the required condition and is a Clausal intimation.

However, Geurts (1999:100) offers '*If the problem was easy, then Kim isn't the one who solved it*'. Here  $A$ , the problem being easy, will be positively

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<sup>149</sup>The original of (33) (Gazdar 1979:115f) has *then* after the comma, where it doesn't feel right, no doubt to make plausible an *if . . . then* paraphrase of  $\rightarrow$  for dramatic effect. Soames (1982:A7.4) focusses on the childish prank which the effect (an intimation of backward causation) indeed amounts to, but this concentration of the attention amounts to introduction of a red herring even if Gazdar's argumentative use of the intimation is a bit fishy itself.

relevant to  $\pi(C)$ , which is that someone solved it. Geurts himself, along with the literature, speaks of ‘non-truth-functional’ grounds for making this putative presupposition, and he specifies that the probability of  $\pi(C)$  is relatively high given  $A$ . He concludes that now the argument from truth-functional grounds (the literature specifies it as ‘Gricean’) no longer goes through. But yet we do intuit  $\pi(C)$  as being projected.

The intent of Geurts’ excellent argument is clear enough, but within a DTS we can not merely codify, but sharpen it. First, we specify the ambiguous ‘relatively high probability’ as  $P(\pi(C)|A) > P(\pi(C))$ . We thereby specify non-truth-functional *relations* as relations of positive relevance. Having done this, we are *not* required to assume that they are *grounds for making* the presupposition. And we should not, because the Satisfaction projection rule, as Heim (1983) and Geurts (1999:114) show, has no need of such grounds. (Whether or not we want them is not predicted by the theory.) But what we can and must say is that the positive relevance relation gets in the way of any mandatory commitment to the effect that  $A \rightarrow \pi(C)$  amounts to the stronger  $\pi(C)$ . When  $P(\pi(C)|A) > P(\pi(C))$ , then  $P(A \rightarrow \pi(C)) = 1 \wedge P(A) > 0$  does not imply  $P(C) = 1$ .

Heim’s (1983:1.2) assertion that the counterexamples to the conditional presupposition rule are unconvincing<sup>150</sup> is itself unsupported by compelling evidence. Geurts (1999:94-113) demonstrates carefully that such efforts at salvaging the ‘satisfaction’/‘filtering’ theory for conditionals and conjunctions are untenable.<sup>151</sup> He also arrives at a similar verdict on Stalnaker’s related modal semantics for conditionals, put in place of material implication.

Gazdar’s Blocking treatments of *if* and *or* are essentially identical, making use of the equivalence of truth-functional explicata  $\neg A \rightarrow B$  and  $A \vee B$ . This equivalence is rarely appealed to as foundational in more recent treatments of conditionals and Gazdar was indeed sceptical about his own semantics for *if*.<sup>152</sup> Yet the equivalence, like Gazdar’s overall approach, has the methodological merit of simplicity and of the transparency that comes with it. It also engages a fundamental property common to both types of expressions have, namely that their atomic subclauses are in non-assertive position. Still, to begin with, we focus entirely on disjunction, for which

<sup>150</sup>Heim, like Kadmon (2001:140), endorses Soames’ judgment.

<sup>151</sup>The most attractive one, proposed by KP, notes that the antecedent  $A$  cannot be assumed false when  $A > C$  is asserted. But this just takes over Gazdar’s predictor, Diffidence, whatever aetiology we give for it.

<sup>152</sup>A paraphrase of Russell’s sentence as ‘Either Ferdinand is drowned or Ferdinand is my only son’ is not a good answer to the query that makes the original felicitous. But yet: it neither differs in its truth conditions nor is it ungrammatical, and it does not project the ppsn either.

the Satisfaction account is acknowledged to mispredict.<sup>153</sup> One systematic reason for doing so is that denial of indicative conditionals  $A > C$  is not usually captured at all well by boolean complementation of  $A \rightarrow C$ ; and persistence under denial is our principal criterion of presuppositional status.

Assertion of content  $A \vee B$  imposes the constraint  $K(A \vee B)$ , where  $K$  is an epistemic necessity operator, indexed by Gazdar to the speaker. In our approach it is indexed to the virtual collective agent to whom common epistemic commitments are imputed. I.e. we have  $P^{j+1}(A \vee B) = 1$ . Call this constraint *Global Confidence* (in the proposition expressed by the complex sentence  $A \vee B$ ). Clausals, the most important kind of implicature in Gazdar's scheme, will now split into two subkinds. Recall that a simple occurrence of  $A \vee B$  carries a fourfold potential Clausal implicature, the set  $\{\neg K(A), \neg K(\neg A), \neg K(B), \neg K(\neg B)\}$  of propositions. We partition this set into two subsets. The first subset comprises constraints of *Local Diffidence* ( $\neg K(A), \neg K(B)$ , i.e.  $P^i(A), P^i(B) < 1$  ( $i = j, j + 1$ )). These, I will argue, should be classed as probabilistic presuppositions. The second subset comprises constraints of *Local Sustenance* ( $\neg K(\neg A), \neg K(\neg B)$ ; i.e.  $P^i(A), P^i(B) > 0$  ( $i = j + 1$ )). These constraints should be called *implications* in view of

THEOREM 1: Local Diffidence  $P(A), P(B) < 1$ , and Global Confidence  $P(A \vee B) = 1$  jointly imply Local Sustenance  $P(A), P(B) > 0$ .<sup>154</sup>

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<sup>153</sup>Heim (1983:1.3) cites disjuncts whose psns each contradict that of the other, e.g. *He either just stopped or just started smoking*, presumably after Soames (1982: ex 53). There is regrettably no mention of disjunction in Kadmon's (2001) extensive review of projection.

<sup>154</sup>Appendix 1 has proofs of this and of the following two very easy theorems for the convenience of readers who do not find them all too obvious. Whatever interest the theorems have will reside in their bare statements and in the use to which they are put. Theorem 1 has a direct equivalent in doxastic modal logics that include the minimal non-trivial logic KD (Merin 2002b). It also implies retraction of a false assertion made in Merin (1999). The claim was that one must rely on 'Brevity' (an unreliable conversational submaxim popularized and also criticized by Grice 1989) to obtain the second, Sustenance pair of Clausals by implicatural reasoning in the manner of Grice. The reason given was that Sustenance does not follow from 'Quantity' as explicated by Gazdar (1979). This statement is correct, but the false claim ignores 'Quality' as re-defined and explicated by Gazdar. (With respect to a faithful explication of Grice's own statement, 'Do not say what you believe to be false and have adequate evidence for what you say', the retracted claim would hold.) However, the proposition thus falsely asserted (falsely, that is, when Gazdar's reconstrual is adopted) seems to have been tacitly taken for granted or at least conceded in the literature, which makes no reference to the real or potential problem. Theorem, proofs, and the attendant correction were presented in August 1999 at the ESSLLI Summer School, Utrecht and on various occasions thereafter including the aforementioned Stuttgart and Berlin symposia.

Theorem 1 says that the Sustenance clausals follow by Diffidence (for which there is the familiar ‘Quantity’ rationale) and ‘Quality’ in the strengthened form proposed by Gazdar. The Sustenance clausals are of no present interest. They do not work right now, even if they are part of reflective intuitions on *or*. More important is the following

OBSERVATION 1: The Diffidence clausals are potential presuppositions by the traditional criterion of persistence under denial, and thus potential probabilistic presuppositions in the narrow sense.  $K(\neg(A \vee B))$  entails  $\neg K(A), \neg K(B)$ ; equivalently,  $P(A \vee B) = 0$  entails  $P(A), P(B) < 1$ . But entailment implies consistency and indeed preservation.

When we deny *A or B*, truth-conditional semantics for its assertoric component tells us that we change the truth value of  $A \vee B$  to its opposite. This is faithfully reflected in the commitment structure.

Now, by way of mandatory accommodation, the Diffidence clausals can be consistently imposed as constraints on CP, prior in evidential discourse time to the assertoric constraint  $P(A \vee B) = 1$ . They will then be probabilistic presuppositions of *A or B*. So, if *A or B* is all that is being properly asserted at  $j$ , and if the assertion is ratified, we shall have a sequence of constraints

$$(34) \quad \begin{aligned} t_e(j): & \quad P^j(A), P^j(B) < 1; P^j(A \vee B) < 1; \\ t_e(j+1): & \quad P^{j+1}(A), P^{j+1}(B) < 1; P^{j+1}(A \vee B) = 1; \\ & \quad (\text{plus } P^{j+1}(A), P^{j+1}(B) > 0). \end{aligned}$$

Our update rule is conditioning, whether by Reflection or otherwise. Conditioning on  $(A \vee B)$  leaves invariant the Diffidence constraint, and thence enforces the Sustenance constraint. Under denial, the denier would refuse to ratify the above proposed update to  $j+1$  and would instead propose an update to  $j+1'$  (parse:  $(j+1)'$ ) satisfying

$$(35) \quad \begin{aligned} t_e(j): & \quad P^j(A), P^j(B) < 1; P^j(A \vee B) < 1; \\ t_e(j+1'): & \quad P^{j+1}(A), P^{j+1}(B) < 1; P^{j+1}(A \vee B) = 0; \end{aligned}$$

I propose that it is the Diffidence clausals which attach to *A or B*. They will do so either as brute lexical defaults or else motivated in one way or another by reference to presumed speaker’s goals and expression alternatives. Whichever option we choose: provided we admit accommodation as a procedure apt for potential bona fide presuppositions, we can now observe that it is *Clausal presuppositions* (specifically: *Diffidence presuppositions*) which precede assertoric content in e-time.

Presuppositional status also attaches to some instances of ‘scalar’ implicature proper. This broadly circumscribed construct is to account for disjointness intuitions variously attending *or*, when that coordinator is presumed to have the truth conditions of inclusive disjunction.

Intuitions on Scalar implicatures are well known to vary widely. At one extreme, there are vague feelings of a weak tendency for disjointness. At the other extreme, there are the intuitions of Gazdar, represented by  $K(\neg(AB))$ , i.e.  $P(AB) = 0$  and often referred to as ‘strong’ Scalar implicature, following Hirschberg (1985). One might feel that the ‘mere tendency’ feeling is captured by what Hirschberg calls ‘weak’ Scalar implicature, namely  $\neg K(AB)$  and which Soames (1982) proposed as a substitute for Gazdar’s stronger intimation.<sup>155</sup> The ‘weak’ Scalar, for what it may be worth, is entailed by the Diffidence clausals (which was Soames’ reason for preferring it). Thus we can make

OBSERVATION 2: The constraint  $\neg K(A \wedge B)$  (equivalently  $P(A \wedge B) < 1$  sometimes called ‘weak’ scalar implicature of *A or B*, is a potential presupposition by the criterion of persistence under denial, and thus a potential probabilistic presupposition in the narrow sense.

Verify its preservation under denial of  $A \vee B$  as an exercise. I am not sure to what extent  $\neg K(A \wedge B)$  by itself will account for any feelings of disjointness.<sup>156</sup> But in conjunction with Global Confidence, we do have a prediction of a bona fide explicatum for such a feeling:

THEOREM 2: Local Diffidence  $P(A), P(B) < 1$  and Global Confidence  $P(A \vee B) = 1$  imply *Negative Interclausal Relevance* [NICR],  $P(B|A) < P(B)$ .

If the Diffidence clausals is all we assume as presupposed in the Common Prior  $j$ , NICR *need* obtain only at the Common Posterior  $j+1$ , obtained by conditioning on assertoric content. (But it also *must* obtain there.) By the nomenclature proposed above, this makes NICR an ‘implication’. This implication is orthogonal to all-or-none context incrementation schemes such as Gazdar’s, and indeed it does not depend on a doctrine of ‘scales’ at all. In explicating the intuition, we do, however, make use of resources of probability which strictly exceed those of traditional doxastic modal logic. With these resources we can make

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<sup>155</sup>The strong reading to obtained in contexts which warranted a particularized condition  $\neg K(AB) \rightarrow K(\neg(AB))$ . I presume such a condition would be an accommodated presumption or presupposition of sorts.

<sup>156</sup>One answer might be to assume presupposed a higher order probability distribution over the condition  $\neg K(AB) \rightarrow K(\neg(AB))$  and its complement.

OBSERVATION 3: An intimation of disjointness of  $A$ ,  $B$  when  $A$  or  $B$  is asserted is predicted as an implication of its Local Diffidence presuppositions and of the Global Confidence requirement on assertions.

We can, however, stay within the confines of modal logic to make

OBSERVATION 4: Gazdar’s proposed Scalar implicature  $K(\neg A \wedge B)$  (equivalently  $P(A \wedge B) = 0$ , sometimes called ‘strong’ scalar implicature of  $A$  or  $B$ , is a potential presupposition in the narrow sense.

The demonstration is easy. When we deny  $A$  or  $B$ , explicated as  $A \vee B$ , we assert  $\neg A \wedge \neg B$ . In doing so, we are proposing that CP  $j$  be updated to  $j + 1'$  (by conditioning within the probabilistic framework) to satisfy  $K(\neg A \wedge \neg B)$ , equivalently:  $P^{j+1'}(\neg A \wedge \neg B) = 1$ . But this entails that  $j + 1$  satisfy  $K\neg(A \wedge B)$ , equivalently:  $P^{j+1'}(\neg(A \wedge B)) = 1$ , which is Gazdar’s Scalar implicature. If the constraint already obtained at  $j$ , i.e. such that  $P^j(\neg(A \wedge B)) = 1$ , it will be preserved under denial and will thus be a presupposition in the narrow sense. If it can be accommodated, it obtains already at context  $j$ , not just at the target context  $j + 1$  of assertion of  $A$  or  $B$ , or at the target context  $j + 1'$  of its denial.

This much we could state in terms of modal logic. However, the motivation for accommodation once more appeals to resources beyond those of modal logic. Accommodation of the constraint  $P(A \wedge B) = 0$  will guarantee a desirable relevance property of disjunction with respect to an issue, in view of

THEOREM 3: When  $P^j(AB) = 0$ , i.e. when  $\neg(A \wedge B)$  is presupposed at  $j$ , the (degree of) relevance of  $A \vee B$  in  $j$  to any issue proposition  $H$  is a convex combination of the relevances of the disjuncts  $A$ ,  $B$ , i.e. is situated between (though not necessarily strictly between) their relevances.

Convexity will be desirable as a default under a view of assertoric discourse which, as a rule, assumes that talk is to some argumentative point, i.e. raising the probability of some such  $H$ .<sup>157</sup> For what it means is that disjunction should become, in a specifiable sense, *relevance-functional*, i.e. compositional with regard to relevance even if the proportion of the mixture is still

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<sup>157</sup>This is not, however, the only motivation for strong Scalar implicature within a DTS; see Merin (1999) and Merin (to appear) for one based on the claim-concession structure of discourse.

context-dependent.<sup>158</sup>

Let us now return to conditionals. The truth-functional equivalence  $A \rightarrow C$  iff  $\neg A \vee C$  implies that Theorem 2 has an immediate corollary by substitution:

THEOREM 4: Local Diffidence  $P(A), P(C) < 1$  and Global Confidence in  $A \rightarrow C$ , i.e.  $P(A \rightarrow C) = 1$ , imply *Positive Interclausal Relevance* [PICR],  $P(C|A) > P(C)$ .

Thus we can reduce the set of assumptions which Frege (1879) makes about indicative conditional schemata *If A, then C* of ordinary language. Frege assumes that (a) the material conditional as a whole is being asserted, by which he seems to mean that it is securely established knowledge. Furthermore, there is a condition of (b) speaker's ignorance of the truth values of each of  $A$  and  $C$  and (c) a positive connection between  $A$  and  $C$  e.g. of a causal nature in the real world. Conditions (a) and (b) already supply all the ingredients of Gazdar's form of Quality and Clausal implicature, minus the deficits and addenda which may be due to Grice. Condition (c) then follows, however Frege may have motivated it or conceived of it; and (b) can be reduced further in line with Theorem 1. Theorem 4 removes what might be considered another redundancy. However, let us not be hasty. Note

THEOREM 5: Interclausal Relevance  $P(C|A) \neq P(C)$  implies both Local Diffidence and Local Sustenance for the two proper subclauses of  $A \rightarrow C$ .

This simple fact (prove as an exercise!) is useful in suggesting a distinction between basic properties of *or* and *if... (then)*. I believe that *or* carries a probabilistic presupposition of Local Diffidence, if not indeed also an intimation of Local Sustenance, as a minimal lexical default. The implication of Negative Interclausal Relevance [NICR] might then very well be just that: an implication of the Diffidence presupposition and of the Confidence commitment entered by assertion.<sup>159</sup> By contrast, the default for *if*, mandatory

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<sup>158</sup>Disjunction becomes *probability*-functional under these conditions, as we can see from the basic additivity axiom. This explains parametrized relevance-functionality when we work our way up from the probability axioms, and is of present interest precisely for this consequence.

<sup>159</sup>Note that, on this hypothesis taken by itself, the disjointness intuition will be predicated on the assumption that our intuitions concerning free-standing sentences are always based on the assertoric target context, reflecting the assertor's ostensible certainty. The prediction is then that the clause  $A$  *or*  $B$  embedded in mandatorily non-assertoric position may lose its statutory tendential disjointness intimation. For disjunctive conditional antecedents and probably for disjunctive disjuncts, this seems to be true. Conditional consequents are not mandatorily non-assertoric (cf. Merin 2002a).

for *if...then* and for occurrences of *if* that admit felicitous completion to *if...then*, is one of (extreme) positive relevance. Suppose this is so—at least for argument’s sake, given that no real evidence is being offered right now. Then we should expect a difference in the behaviour of *or* and *if...then* on these grounds alone. But will it impugn Gazdar’s account?

The relevance condition will obtain already at our utterance context  $j$ , not only at the target context  $j + 1$ . Thus, in our most general sense, it is a probabilistic presupposition. Will it be a probabilistic presupposition also in the narrower sense of invariance under denial? This depends on how specific the relevance condition is and on how we construe denial for conditionals, which is notoriously ambiguous.

The most common form of flat denial, as Ramsey (1929a:[147f.]) pointed out, is one where we retain the antecedent and deny the consequent. This means that we treat the indicative conditional  $A > C$  (i.e. *If A, (then) C*), whose probability we represent, following Ramsey, as  $P(C|A)$ , like a proposition. Ratified denial of  $A > C$  imposes the constraint  $P^{j+1}(C|A) = 0$ , which is equivalent to  $P^{j+1}(\neg C|A) = 1$ , i.e. to assertion of *If A, (then) ¬C*. Thus, denial of the conditional amounts to denial of the consequent, in the sense given. The ‘suppositional’ antecedent  $A$ , much like a presupposition, remains unaffected. This implies that  $A$  continues to be extremely positive to the consequent. But now this consequent is the negation  $\neg C$  of the former consequent  $C$ . Thus we can make

OBSERVATION 5: The condition that  $A$  be extremely relevant to  $C$ , i.e. that  $P(C) \neq P(C|A) \in \{0, 1\}$ , is a potential probabilistic presupposition of assertoric *If A, (then) C* under the antecedent-preserving construal of denial.

When  $P(C) < P(C|A) = 1$  holds,  $A$  is extremely positive to  $C$ . When  $P(\neg C) < P(\neg C|A) = 1$  holds, then  $P(C) > P(C|A) = 0$  holds and we see that  $A$  is extremely negative to  $C$ . The join/union of these conditions is that  $A$  is extremely relevant to  $C$ , i.e. relevantly  $P$ -entails it or its negation.

The cases where denial yields the truth-functional negation,  $A \wedge \neg C$ , of  $A \rightarrow C$  and the cases where the relevance of  $A$  to  $C$  is either denied or intimated to fall short of extreme relevance are fairly involved and I have dealt with them elsewhere (Merin 2002a). But we have a useful conclusion in the form of

OBSERVATION 6: Under the most common construal of negation of conditionals, the one that needs no explicit *even if* conditional, nor an antecedent commitment to  $A$ , both the Diffidence and Sustenance clausals are potential probabilistic presuppositions of *If A, then C*.



This holds because, as Theorem 5 notes, they are entailed by the Inter-clausal Relevance presupposition,  $P(C) \neq P(C|A)$ , which is preserved under Ramsey-denial. Since Gazdar makes essential appeal to Diffidence in his account of conditionals, he is still fully covered.

However, there is a problem for this account, posed by ‘modus ponens’ style discourses. Suppose you say: *The light is on. If the light is on, Kim is in.* It seems reasonable to assume that, by the time you utter the conditional, you assume that its antecedent is true. Our technical epistemic terms rest on the procedural assumption that each complete assertoric sentence is a demand for an update of the common prior to a common posterior which is the prior for the next sentence. If so, the speaker appears to presume (and can presume if there is no objection after the first utterance) that  $P^j(A) = 1$ . Here  $j$  is the context to be transformed by utterance of the indicative conditional  $A > C$  into a context  $j+1$  such that  $P^{j+1}(C|A) = 1$ . But  $A$  cannot be relevant to  $C$  at  $j$  if  $P^j(A) = 1$ . Similarly, the ignorance condition regarding  $A$  is not satisfied. Note that ‘*The light is on. Either the light isn’t on, or Kim is in*’ is not an acceptable sequence.

A well known, but not universally known, proposal to deal with this problem is due to Frank Jackson (1979). He maintains that part of the lexical meaning of *A or B* is a condition that it be ‘robust’ with respect to denial of each of its clauses. This means that if  $P(A \vee B)$  is high, each of  $P(A \vee B|\neg A)$  and  $P(A \vee B|\neg B)$  should remain almost as high.<sup>160</sup> By contrast, ‘*If A, C*’ is said to be subject only to the condition that it be robust with respect to affirmation of its antecedent, i.e. that if  $P(A \rightarrow C)$  is high,  $P(A \rightarrow C|A)$  should be high too, which is always true when  $P(C|A)$  is sufficiently high.

The merits of making robustness, which entails Local Diffidence and Sustenance for *or*, the basic non-truth-conditional condition on these two constructions are not easily assessed without extensive analysis of data. Let me just indicate that I should prefer the combination of Diffidence for *or* and positive relevance of the conditional antecedent either to the consequent or to a third proposition which is positive to the consequent. But in each of the latter cases, we are up against the ‘modus ponens’ style inference.

On systematic grounds, I advocate a solution about which I still feel uneasy, but which has some serious arguments going for it.<sup>161</sup> This is to assume that the conditional in such contexts is treated as if it were part of

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<sup>160</sup>Skyrms (1975) demands that it be ‘resilient’, which does not impose the antecedent high probability condition explicitly, though the context makes plain that only highly probable propositions are being considered.

<sup>161</sup>Landman (1986) has essentially the same idea, though perhaps for different doctrinal reasons.

a sequence ‘*If the light is on, Kim is in. The light is on.*’

In saying ‘as if’, I do not mean that some strange discourse-syntactic transformation of utterance-order-inversion is involved. Rather, I mean that the conditional has the ostensible discourse status of a *reminder*. It is treated as a prior presumption, i.e. as an *accommodatum* or a kind of *accommodatum*. What speaks for this treatment is its intuitive status as an instance of a general law subject to the usual *ceteris paribus* proviso: if someone’s light is on, they are in.<sup>162</sup> The utterer of the conditional is ignoring such provisos, else he would be hedging his statement. But a general law is typical shared background knowledge, and universal specification is a valid form of inference.<sup>163</sup> To the extent of being law-like, the conditional is an excellent candidate for being a mere reminder of something already accepted. In so far as it depends for its relevance to a current issue on universal instantiation or on a more occult relation of instance-formation, it is nomological and thus predestined to be taken for granted.<sup>164</sup> By contrast, there is nothing general about the antecedent.

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<sup>162</sup>See also Appendix 2, Section 4.

<sup>163</sup>See Merin (1996, 1999:Sec.V) for instances and applications of universal specification in the scope of a probability operator.

<sup>164</sup>Cf. Ramsey (1929a), who held that nomological sentences were not propositions. If so, they cannot be evidentially relevant, in our technical sense, to any proposition, in particular to no issue proposition. This might be one explanation for the ready accommodability of putative laws that are not altogether inconsistent with experience (see Appendix 2, Section 3)—if it could be sustained. But the consistency requirement seems to require some propositional avatars of laws, and what exactly the non-propositional ontology of lawlike statements will look like is an open question. So I remain uncertain about the viability and import this option. A rather less occult aspect of conditionals  $A > C$  (and presumably a manifestation of Ramsey’s idea) which might explain their ready accommodability is the constitutive *endocentric* relevance relation that obtains between clauses  $A$  and  $C$ , here positive (PICR; see Theorem 4, above). We distinguish these from mandatory direct *exocentric* non-zero relevance relations with respect to some proposition  $H$  that is not a truth function of  $A$  and  $C$ . It is direct irrelevance that is our criterion of each-way proper accommodability. See Merin (2002a) for an explication of, and a new twist to, the familiar hypothesis that conditionals are not propositions; and Merin (in press) for more on the endocentric/exocentric distinction in the context of anaphora. See also Section 4 of Appendix 2, below for lawlikeness and substitution instances.

### 13. Outlook

One technical result of our investigation is that a counterintuitive feature of Gazdar's projection scheme is no longer counterintuitive. What appear to be implicatures in terms of a would-be causal motivation apud Grice, and thus in causal, physical time, are presuppositions in evidential, discourse time structured by Bayesian update constraints.<sup>165</sup>

Quite in line with Gazdar's useful notions of potential presupposition and potential implicature, we have pleasant monotonicity of constraint incrementation throughout, for we treat changes of non-extreme probabilities as still covered by the monotonicity postulate defined for deductive consequence relations. It is only in cases of outright presupposition violation that we must abandon the relative calm of Bayesian waters for the uncharted seas of properly non-monotonic commitment revision.

Gazdar's kinematic approach to presupposition was stated entirely at the level of propositional relations. Whatever subsentential relations were engaged in the data to be addressed were quickly rephrased in propositional terms by what amounted to a substitutional interpretation of quantificational aspects of their formal description. More recent approaches to presupposition within kinematic semantics proceed essentially or directly in terms of assignments, which are constructs familiar from the standard semantics of predicate logic (Kamp 1981, Heim 1982).

Such semantics are committed to a worldly ontology of denotata for sub-clausal expressions—an ontology of individuals and relations on them. Prima facie this is a step forward, not least because the study of presupposition thereby becomes fully part of subsententially committed semantics.

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<sup>165</sup>Gazdar defended Grice against some early critics while at the same time voicing agnosticism. We might therefore ask: Was Grice's doctrine of implicature from 'Quantity' a philosophical advance? The rationale for it in terms of maximizing logical strength was textbook material already in the 1940s (see the note in Section 7, above). Its tenability is not so clear either. Frank Jackson (1979) questioned the rationale on the grounds that often enough we want, and ought to, utter something that will remain true under various adverse contingencies, i.e. something robust or, as Brian Skyrms had put it earlier in the context of scientific assertions, 'resilient' (Skyrms 1975). So there was a rationale for asserting the logically weaker. David Lewis, changing his mind on Quantity, concurred (Lewis 1986a); but this line of thought did not extend across the divide that had by then opened up between linguistic and philosophical research. The proposal in Merin (1999: Sec.IV) makes some assumptions about conditional independence which are motivated on a variety of grounds, and thence shows that the conjunction of propositions which are positively relevant to an issue proposition  $H$ , short of entailing it, will be more positively relevant, a stronger argument for  $H$ , than their disjunction. On this perhaps more commonsensical basis, the kind of reasoning which Mill (unearthed by Horn 1989) and others have pursued can be applied with profit. But we have seen above that there are at least two further rationales to appeal to.

We do not lose the ability to attend to purely propositional relations, since predicate calculus is a conservative extension of propositional calculus, the latter being that fragment of the former whose predicates are all of zero arity. Still, there is a difference of emphasis in analysis, because the newly gained power will suggest that certain kinds of relations are explanatorily pertinent which the weaker system had no means of addressing.<sup>166</sup> The result may just happen to be that we do no longer search for explanations in inter-propositional relations which have not yet been fully explored.

Some of our explanations did make reference to sub-propositional properties such as domain size whose restatement in purely substitutional terms would be artificial if indeed possible at all. The explanation for the existential prejudice of Wh-questions in terms of flat, maximally entropic priors (or at the very least non-kinky priors) is a case in point. But already their eminent defeasibility takes us back to propositional relations, and the alternative explanation in terms of habitual anaphora, which is suggested by a sub-propositional approach, turned out to be reliant on statistical generalizations of uncertain import for justificational purposes.

The Markov property of discourse, to the extent that it holds up, is again a global, propositional phenomenon. Likewise, the relevance-enhancing property of accomodation of a negative presupposition was stated purely at the propositional level. Our policy, pursued in division of labour with other approaches, was to try and explicate apparently sub-propositional properties and relations in terms of propositional properties and relations.<sup>167</sup>

In a decision-theoretic framework there are indeed reasons that militate for attending to propositional relations: propositions are bona fide objects of attitudes. Nothing of equal theoretical import can be said about individuals: knowing who, for one, does appear to reduce to knowing that, as far as formally intelligible treatments go. Presuppositional relations as usually construed are relations of presumed common knowledge, conviction, or commitment. This makes them natural constructs of theories of interactive

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<sup>166</sup>I speak naively. The natural way of pursuing the propositional line is in terms of a substitutional interpretation of quantification, roughly, the idea that a universal (existential) sentence is true iff all (at least one) of its syntactic substitution instances of variables by constants are (is) true. See Kripke (1976:328-337) for basic distinctions with regard to the objectual interpretation. See Leblanc (1983) for a review of this approach, which goes back to the early Frege and Ramsey, and of the related approach to probabilistic semantics for propositional and first-order logic, going back to K. Popper, H. Gaifman, R. Stalnaker, W.L. Harper, and H. Field. This is the foundational line a decision-theoretic semantics would pursue with respect to ‘probability-free’ sentences of first-order languages that underlie the reconstruction of lawlike relations (notably in Appendix 2).

<sup>167</sup>The explanation of an apparent language universal in Merin (1996, 1999) is an exercise in explicating the distinction between universals and particulars, making no extramental or extrasocial assumptions about their distinctness.

decision-making, which make up the field of inquiry known generically as game theory. A decision-theoretic approach to meaning will thus appeal as far as possible to propositions and to the epistemic or doxastic constructs that go with them.

But why pursue a decision-theoretic approach at all? Our principal and overriding criterion for doing so must be explanatory performance. But such performance is by definition relative to a domain of explananda. There are various ways in which that domain can be extended, and one of them is by articulation with issues that have not been uppermost in the analytic imagination. One way to articulate it with issues of this kind, giving credit where due, is in reconsidering a pioneer contribution to pragmatics that may have gotten closer than any to having effected such an articulation.

Ducrot's late 1960s approach to pragmatics<sup>168</sup> distinguishes assertion [A], presupposition [P], and *sous-entendu* (literally, in ordinary French and elevated English: what is understood as a sub-text, i.e. conversational implicature) [S]. A and P are part of linguistically determined and arbitrary meaning, S 'emerges from reflection by the addressee on the circumstances of utterance of the message' (1969:[25]). This does not seem to differ much from what Grice and those who took up his work in linguistics were saying at around the same time. But there was a difference all the same. First, there was the exquisitely insightful Chaining Rule. Secondly, so Ducrot observed, responsibility for A is the speaker's; that for S is ostensibly the addressee's (who is being allowed to supply it); that for P is ostensibly shared and is represented as an anterior commitment of both speaker and addressee.<sup>169</sup>

Ducrot offered significant empirical detail, not found elsewhere at the time. We have seen some of it above and we have refined or modified the analysis of P to take account of the origins of the presupposition when it is reflected in distributional data. When the presupposition does not co-incide (modulo e-temporal distinctions) with an entailment of the assertion A, its origin is deemed to be the addressee. Assent to it is much like submission to an imposition, which is not self-policing: given a choice, the speaker would renege, as he may indicate by a suspender clause.

Ducrot did not consider such possibilities, as far as I am aware. But he did take, at the time, a pico-political stance on communication which easily extends to explanatory hypotheses of this kind. Its undertone, reminiscent of Hobbes, differs sharply from a received view—current then, and perhaps still current now—which is more likely to take its cue from Leibniz if not from Voltaire's depiction of him. Ducrot writes:

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<sup>168</sup>Ducrot (1968, 1969), also reported in Ducrot (1972).

<sup>169</sup>Which Stalnaker, taking up the barrister's and Grice's term, was calling common ground; and which had earlier been noted by Sellars under the label 'shared belief'.

Language thus offers to each conversationist the possibility of making the other a prisoner of an intellectual universe created in the dialogue itself. Polemic is not, under such conditions, a secondary function of language, dependant entirely on the contents which our language happens to transport. It has its foundation in the very nature of the linguistic expression, which puts at the speaker's disposal at any time, in the form of presuppositions, a kind of net in which to wrap up his adversary. (Ducrot 1968a:52)

If something like-sounding were to be found, say, in the writings of the late Michel Foucault, it would presumably not mean just quite as much. It would not, because it would not have been part of a theory of little puzzling facts of language: i.e. not part of a theory of language. But here it was presented as such, in line with the best standards of formulation prevailing at the time and with comparable attention to detail. Whatever became of Ducrot's idea as time went by and parochialism began to take its toll, it represented a direction of language studies that might have been pursued on a larger scale right there and then. But this direction was not explored; for one, because not even the bare suggestion made it past the metropolitan gatepost.

Why it did not is a bit harder to tell. Among the scholars who defined the agenda of global, transatlantic pragmatics from the early 1970s onwards there were, after all, recent graduates in French linguistics, travellers to and from the language's cultural centre, Paris. Ducrot was a most prominent, perhaps the most prominent of francophone semanticists of the time, published in the leading French journals and in a best-selling collection for the average intellectual in the street (Ducrot 1968b). If one reads his late 1960s and early 1970s publications, they do not seem to underperform what was then forthcoming in the academic *lingua franca*. But Ducrot did not publish in that medium. One must infer that he did not wish to be drawn into a transatlantic discussion, and that his tacit request to such effect was duly respected.

But due regard for personal sensibilities cannot alone explain the omission of his work from monograph bibliographies during the ten or fifteen years when the dice for a textbook- and handbook-filling discipline of pragmatics were being cast. Scholars work by a civic duty not only to sift, but also to inform. So the principal explanation must be that the stance he had taken, though presented without animus, was shocking enough to be considered impossible to convey. It must have been denying an absolute presupposition of linguistics and of related, self-consciously analytic philosophy, a presupposition held at the time and conceivably still held today.

The presupposition can perhaps be identified in rough outline. If language, so it seems to go, is not primarily an instrument of private reasoning,

then at least it is an instrument for purely cooperative reasoning. The last thing it could therefore be, in any scientifically and philosophically interesting sense, is part of political process and indeed part of the politics of influence,<sup>170</sup> both *intra mures* and *extra mures*.

The presupposition has practical and theoretical implications. The former, practical in the sense introduced by Kant, are anybody's guess on a clear day, and so they are neither here nor there. The tenability of the latter has been scrutinized above, and the recommendation is to let go the implicans.<sup>171</sup>

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<sup>170</sup>If that mellifluous expression is not a pleonasm.

<sup>171</sup>My thanks for helpful discussion and encouragement go to participants from Stuttgart, Tübingen, and farther afield at the October 2000 Workshop on Presupposition where the main arguments and results of Sections 2 to 7 and 12 were presented—above all to Hans Kamp. For comments I am also grateful to participants of the Formal Pragmatics Workshop, Berlin March 2001, where a short version was distributed as the handout accompanying a plenary talk. I owe more thanks yet to Gerald Gazdar of the University of Sussex for commenting on aspects of an intermediate draft. For an application of the probabilistic framework for presupposition to the problem of anaphora from definite pro-forms to indefinite noun phrases (Kamp and Reyle (1993), Kamp and Reyle (to appear), and van der Sandt (1992)), see Merin (in press). Preparation of the present work was supported by the German Research Council (DFG) SFB 471.

## Appendix 1: Proofs, Some Definitions and Explanations

We begin with a recall of basic definitions and notation. A probability function  $P = P^i$  is a function with values in the closed real number interval  $[0, 1]$  and with arguments in a boolean algebra  $\mathcal{F}$  whose elements  $A, \neg A, B, \dots$  are usually called events, and which are often identified with propositions or sets of possible worlds. The minimal element of  $\mathcal{F}$  is  $\emptyset$  (e.g. the contradictory proposition or empty set of worlds); its maximal element is  $\Omega$ , e.g. the tautological proposition or universal set of worlds.  $P$  is characterized by the axioms (K1)  $0 = P(\emptyset) = P(A \cap A) \leq P(A) \leq P(A \cup A) = P(\Omega) = 1$  and (K2)  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ . (For  $A \cup B$  we also write  $A \vee B$ , for  $A \cap B$  we also write  $A \wedge B$  or  $AB$ .) An ordered pair  $(\mathcal{F}, P)$  is called a probability space. When the elements of  $\mathcal{F}$  are sets, the probability space is usually written as a triple  $(\Omega, \mathcal{F}, P)$ . Note: Downsizing a universal set  $\Omega$  or restricting our language already opens up the possibility of relativizing the notion of tautology.

We prove Theorem 1 via its equivalent in modal logic. This way we exhibit a relationship that was already mentioned in the main text. We assume that  $K$  is doxastic necessity ('certainty') in a normal modal logic which includes the basic non-trivial system KD. (We make no use of further axioms such as '4' (introspection) or 'T' (facticity).)

LEMMA: If  $\neg K(A)$ ,  $\neg K(B)$  and  $K(A \vee B)$ , then  $\neg K(\neg A)$ ,  $\neg K(\neg B)$ .

*Proof:* 1.  $K(A) \wedge K(B)$  iff  $K(A \wedge B)$  (by normality of  $K$ ). 2.  $\neg K(B)$ ,  $K(A \vee B)$  (by assumption). 3.  $K(\neg A)$  (supposition for reductio), 4.  $K((A \vee B) \wedge (\neg A))$  (1,2,3). 5.  $K(B)$  (from 4; contradicting 2). 6.  $\neg K(\neg A)$  (3,5,  $\neg$ -introduction). 7. Similarly for  $\neg K(\neg B)$ .  $\square$

THEOREM 1: If  $P(A), P(B) < 1$  and  $P(A \vee B) = 1$ , then  $P(A), P(B) > 0$ .

*Proof:* 1. Define, for any proposition  $X$ ,  $K(X)$  iff  $P(X) = 1$ .  
2. Substitute everywhere in the Lemma and its proof.  $\square$

THEOREM 2: If  $P(A), P(B) < 1$  and  $P(A \vee B) = 1$ , then  $P(B|A) < P(B)$ .

*Proof:* 1.  $P(A), P(B) < 1$ . [Assumption]  
2.  $P(A \vee B) = 1$ . [Assumption]  
3.  $P(A \wedge B) = P(A) + P(B) - P(A \vee B)$ . [Prob. Axioms]



4.  $P(A \wedge B) = P(A) + P(B) - 1$ . [1,2]
5.  $P(A) = 1 - \alpha$ ;  $P(B) = 1 - \beta$  for some  $0 < \alpha, \beta < 1$ . [1,2,Th.1]
6.  $P(A \wedge B) = 1 - \alpha - \beta$ . [4,5]
7.  $P(A)P(B) = 1 - \alpha - \beta + \alpha\beta$ . [5]
8.  $P(A \wedge B) < P(A)P(B)$ . [5,6,7]
9.  $P(B|A) < P(B)$ . [5,8]  $\square$

The third theorem will be proved for a typical class of evidential relevance functions, the likelihood ratio  $P(E|H)/P(E|\neg H)$  and its logarithmic transform,  $r_H(E)$ , where  $E$  is intuited to be an evidence proposition whose relevance to some hypothesis  $H$  is being assessed. Recall that other evidential relevance functions are monotone increasing functions of this function.

**THEOREM 3:** If  $P(A \wedge B) = 0$ , then  
 $\min[r_H(A), r_H(B)] \leq r_H(A \vee B) \leq \max[r_H(A), r_H(B)]$ .

*Proof:* 1.  $P(A \wedge B) = 0$ .  
2.  $P(A \vee B|H)/P(A \vee B|\neg H) =$   
 $= [P(A|H) + P(B|H)]/[P(A|\neg H) + P(B|\neg H)]$  (by 1)  
 $= [P(A|\neg H)/[P(A|\neg H) + P(B|\neg H)]] \cdot [P(A|H)/P(A|\neg H)]$   
 $+ [P(B|\neg H)/[P(A|\neg H) + P(B|\neg H)]] \cdot [P(B|H)/P(B|\neg H)]$   
 $= \alpha[P(A|H)/P(A|\neg H)] + (1 - \alpha)[P(B|H)/P(B|\neg H)]$  where  $\alpha \in [0, 1]$ .  
3. Hence  $r_H(A \vee B) = \beta r_H(A \vee B) + (1 - \beta)r_H(A \vee B)$  for some  $\beta \in [0, 1]$ .  
 $\square$

We conclude the appendix with a proof of Proposition 2 (Merin 1997a). The proof is intended to be perspicuous to the general reader and, in the interest of time saved, no steps are left out. The Proposition shows that accommodation of a presupposition such as, for instance, the existence presupposition of a negated sentence with a definite description in topic position increases any non-zero relevance it may have, preserving sign (i.e. multiplies relevance value by some positive factor  $k > 1$ ). To avoid clutter, we use the  $AB$  notation for  $A \wedge B$ .

**PROPOSITION 2:** If (i)  $\neg S \models \Theta$  (i.e.  $S\neg\Theta = \neg\Theta$ ) and (ii)  $0 < P^i(S), P^i(S\Theta), P^i(S\neg\Theta) < 1$  and (iii)  $(\Theta \perp_i H)$ , then  $\text{rel}_{H|\Theta}^i(S) = k \cdot \text{rel}_H^i(S)$  where  $k > 1$ .

*Proof:* We omit index  $i$ . Let  $R$  be any fixed relation symbol in the set  $\{>, =, <\}$ . We first consider the case where  $R$  is  $>$ :

1.  $P(H|S) > P(H)$ . [Supposition]
2.  $P(HS) > P(H)P(S)$ . [1]
3.  $P(HS)P(\neg\Theta) > P(H)P(S)P(\neg\Theta)$ . [2,ii]

4.  $P(HS)P(S) - P(H)P(S)P(\neg\Theta) > P(HS)P(S) - P(HS)P(\neg\Theta)$ . [3]
5.  $P(HS)P(S) - P(H)P(S)P(\neg\Theta) > P(HS)[P(S) - P(\neg\Theta)]$ . [4]
6.  $[P(HS) - P(H)P(\neg\Theta)]/[P(S) - P(\neg\Theta)] > P(HS)/P(S)$ . [5,ii]
7.  $[P(HS) - P(H\neg\Theta)]/[P(S) - P(\neg\Theta)] > P(HS)/P(S)$ . [6,iii]
8.  $[P(HS) - P(HS\neg\Theta)]/[P(S) - P(S\neg\Theta)] > P(HS)/P(S)$ . [7,i]
9.  $P(HS\Theta)/P(S\Theta) > P(HS)/P(S)$ . [8, ProbCalc]
10.  $P(H|S\Theta) > P(H|S)$ . [9, Def Cond Prob]
11.  $P(H|S\Theta) - P(H) > P(H|S) - P(H)$ . [10]
12.  $P(H|S\Theta) - P(H|\Theta) > P(H|S) - P(H)$ . [11,iii]
13.  $\text{rel}_{H|\Theta}(S) > \text{rel}_H(S)$ . [12]

Here  $S$ , which was positive to  $H$  will become more positive to  $H$  than it already is. If  $R$  instantiates to  $<$  i.e. when  $S$  is negative to  $H$ , then  $\text{rel}_{H|\Theta}(S) < \text{rel}_H(S)$ , so  $S$  will become more negative to  $H$  than it already is. If  $R$  instantiates to  $=$ , i.e. when  $S$  is irrelevant to  $H$ , then  $\text{rel}_{H|\Theta}(S) = \text{rel}_H(S)$ , so  $S$  will retain its zero relevance to  $H$ . We thus cover all three cases with

14.  $\text{rel}_{H|\Theta}^i(S) = k \cdot \text{rel}_H^i(S)$  where  $k > 1$ .  $\square$

Remark: Our conditions (ii) ensure that there is no threat of division by zero. The case where  $H$  is not  $i$ -contingent and therefore not an issue is a special case of the condition where  $R$  instantiates to  $=$ . Note also the following

FACT: Conditions (i), (ii) and (iii) jointly rule out the cases  $P^i(H|S) = 1$  and  $P^i(H|S) = 0$  for  $i$ -contingent  $H$  and thereby the case where  $S$   $i$ -entails one of  $i$ -contingent  $H$  or  $\neg H$ .

*Proof:* Suppose for reductio  $P(H|S) = 1$ . Hence,  $P(S) = P(HS)$ . Therefore  $P(\neg\Theta) = P(S\neg\Theta)$  only if  $P(\neg\Theta) = P(HS\neg\Theta) = P(H\neg\Theta)$ . But then  $P(H|\neg\Theta) = 1$ , and  $i$ -contingent  $\Theta$  cannot be irrelevant to  $H$ , which is condition (iii). Similarly for the supposition  $P(\neg H|S) = 1$ .  $\square$

For variety and good measure, here is a proof of Proposition 2 for the (log-)likelihood-ratio measure.

PROPOSITION 2': If (i)  $\neg S \models \Theta$  (i.e.  $S\neg\Theta = \neg\Theta$ ) and (ii)  $0 < P^i(S), P^i(S\Theta), P^i(S\neg\Theta) < 1$  and (iii)  $(\Theta \perp_i H)$ , then  $r_{H|\Theta}^i(S) = k \cdot r_H^i(S)$  where  $k > 1$ .

*Proof:* Recall that  $r_H^i(S) =_{df} \log[P^i(A|H)/P^i(A|\neg H)]$  and that  $r_{H|\Theta}^i(S) =_{df} \log[P^i(S|H\Theta)/P^i(S|\neg H\Theta)]$ . We drop the index  $i$ , omit the log-transform, and proceed straight in terms of Bayes factors. Lines without labels on the right follow by probability axioms or arithmetic.

1.  $S \neg \Theta = \neg \Theta$ . [i]
2.  $0 < P^i(S), P^i(S\Theta), P^i(S \neg \Theta) < 1$ . [ii]
3.  $P(H\Theta) = P(H)P(\Theta)$ . [iii]
4.  $P(S|H)/P(S|\neg H) = [P(HS)/P(\neg HS)] \cdot [P(\neg H)/P(H)]$ .
5.  $P(S|H\Theta)/P(S|\neg H\Theta) = [P(HS\Theta)/P(\neg HS\Theta)] \cdot [P(\neg H\Theta)/P(H\Theta)]$
6.  $= [P(HS\Theta)/P(\neg HS\Theta)] \cdot [[P(\neg H)P(\Theta)]/[P(H)P(\Theta)]]$  [5,3]
7.  $= [P(HS\Theta)/P(\neg HS\Theta)] \cdot [P(\neg H)/P(H)]$ . [6,2]
8.  $P(HS\Theta)/P(\neg HS\Theta) = [P(HS) - P(HS \neg \Theta)]/[P(\neg HS) - P(\neg HS \neg \Theta)]$
9.  $= [P(HS) - P(H \neg \Theta)]/[P(\neg HS) - P(\neg H \neg \Theta)]$  [8,1]
10.  $= [P(HS) - P(H)P(\neg \Theta)]/[P(\neg HS) - P(\neg H)P(\neg \Theta)]$ . [9,3]
11.  $P(S|H\Theta)/P(S|\neg H\Theta) =$   
 $= [[P(HS) - P(H)P(\neg \Theta)]/[P(\neg HS) - P(\neg H)P(\neg \Theta)]] \cdot [P(\neg H)/P(H)]$   
[10,2]
12.  $= [P(S|H) - P(\neg \Theta)]/[P(S|\neg H) - P(\neg \Theta)]$ . [11]
13.  $P(S|H) > P(S|\neg H)$ . [Supposition]
14.  $P(S|H) > P(\neg \Theta), P(S|\neg H) > P(\neg \Theta)$ . [1,3]
15. Let  $a = P(S|H), b = P(S|\neg H), c = P(\neg \Theta)$ .
16. If  $a > b > c > 0$ , then  $(a - c)/(b - c) > a/b$ .
17.  $P(S|H\Theta)/P(S|\neg H\Theta) > P(S|H)/P(S|\neg H)$ . [13,14,15,16]
18. Repeat [13-17] analogously for  $P(S|H) = P(S|\neg H)$  (i.e.  $a = b$ ) and for  $P(S|H) > P(S|\neg H)$  ( $a < b$ ). Now take logs :
19.  $r_{H|\Theta}^i(S) > / = / < r_H^i(S)$  as and when  $r_H^i(S) > / = / < 0$ . [17,18]
20.  $r_{H|\Theta}^i(S) = k \cdot r_H^i(S)$  where  $k > 1$ . [19]  $\square$

For [14] recall that  $P(H)[P(S|H) - P(\neg \Theta)] = P(HS) - P(H)P(\neg \Theta) = P(HS) - P(H \neg \Theta) = P(HS) - P(HS \neg \Theta)$  by [3] and [1], respectively.  $P(HS) - P(HS \neg \Theta)$  is always non-negative, and [1,3] also ensure that  $P(HS) > P(HS \neg \Theta) > 0$ . Moreover,  $P(H) > 0$ , so inequalities are respected. Similarly for the second inequality of [14], i.e. the denominator of [11]. To verify [15], evaluate  $(a - c)/(b - c) - a/b$ . First multiply through by  $b(b - c)$ . Evaluate thus  $b(a - c) - a(b - c) = ab - bc - ab + ac = ac - bc > 0$ .

Finally, let me give what is perhaps the most useful of explanations of Proposition 2 in probability terms which apply to any relevance function. The entailment assumption (i),  $\neg \Theta \models S$ , holds if and only if  $\neg \Theta = S \neg \Theta$ . The independence assumption (iiI),  $(H \perp \Theta)$ , holds if and only if  $(H \perp \neg \Theta)$ . Hence,  $(H \perp S \neg \Theta)$ . In other words,  $\neg \Theta$  is the element of  $\mathcal{F}$  (or set of worlds) over which  $S$  is independent of  $H$ , i.e. irrelevant to  $H$ . (Check that this means that  $P(S \neg \Theta|H)/P(S \neg \Theta|\neg H) = 1$ , i.e. that  $\text{rel}_H(S \neg \Theta) = r_H(S \neg \Theta) = 0$ .) By conditioning on  $\Theta$ , we are assigning zero probability mass to  $S \neg \Theta$ . Renormalizing by dividing by  $P(\Theta)$  (which is less than unity) means that we are spreading the probability mass of  $S \neg \Theta$  over  $\Theta$ . Now suppose that  $S$

had been positive to  $H$  to start with. Then we are disregarding its irrelevant part,  $S-\Theta$ , and so the probability of  $H$  conditional on  $S$  goes up.

This last, intuitive part of the description can be made precise.  $S$  is the disjunction (union)  $S\Theta \vee S-\Theta$  of  $S\Theta$  and  $S-\Theta$ . By the probability axioms, we have  $P(S\Theta \wedge \neg\Theta) = 0$ . (Recall that  $P(X\neg X) = 0$ .) But we know from Theorem 3 (stated and proved above) that the relevance of  $S$  to  $H$  is a convex combination of the relevances of  $S\Theta$  and  $S-\Theta$ . Now,  $r_H(S-\Theta) = 0$ , and our assumptions rule out the degenerate case of entailment (that is entailment modulo sets of  $P$ -measure zero) of  $H$  by  $S$ , where the convex combination weights may be 1 and 0 and the relevance of the disjunction is identical to the relevance of one of the disjuncts. Our supposition of positive relevance also rules out the case where both of  $S\Theta$  and  $S-\Theta$  are irrelevant to  $H$ . Hence the degree of relevance of  $S$  to  $H$  lies strictly between that of  $S-\Theta$  (which is zero) and that of  $S\Theta$ . Accordingly,  $r_H(S\Theta) > r_H(S)$ . Conditioning on  $\Theta$  preserves proportions of  $P(H)$  and  $P(\neg H)$  (since  $(H \perp \Theta)$ ). Hence,  $r_{H|\Theta}(S) > r_H(S)$ . The analogous argument goes through for  $<$ . For  $=$ , we have the case of equality of relevances of the disjunct, zero for each. (Exercise: Construct another proof.)

## Appendix 2: Phenomenology of Presupposition Projection

That a key objection to the Blocking account is otiose will be at best of academic interest to students of language if that account is deeply flawed on other grounds already. In this appendix, I will critically examine the putative counterexamples to Gazdar's blocking account of presupposition projection which are offered in two recent surveys, (Kadmon 2001:137ff.) and Beaver (1999). My conclusion will be that they are not counterexamples and that some of them are indeed thought-experimental artefacts. I will also look at two classes of examples which have been offered to conduct an argument that some reputedly robust presupposition triggers are less robust than they have been held to be. It will be shown that the argument is problematic for the first class (which is of independent, but presently subsidiary interest) while that for the second class is an artefact based on underestimation of the import of the Blocking theory.

The examination will be minute and there will be a fair bit of data. Most of the appendix can indeed be read without reference to the probabilistic doctrine of a DTS. But the examination will also apply parts of the DTS hypothesis to a benchmark example.

### 1. Kadmon's putative counterexamples to Blocking.

Recall the unproblematic example (31), here repeated as

(36) If someone has solved the problem, it is Julia who [has] solved it.

Consider next the putatively problematic examples which are intended to support the widely accepted claim that Blocking and Satisfaction accounts are both needed.

(37) If someone at the conference solved the problem, it was Julia who solved it. (Soames 1982 ex. 49)

(38) If John has twins, Mary will not like his children. (Peters-Heim 1)

(39) If John has children, Mary will not like his twins. (Peters-Heim 2)

(40) [Assume: a state can have either a president or a king, not both.] If there is a president of Beneficia, he lives in a palace. The king did not come out of his palace yesterday to make his speech. (Landman)

(37) and (38) do not retain the presupposition of their consequent. Blocking is alleged to predict projection, on the grounds that the antecedent *A* is

logically weaker than the alleged presupposition  $\pi(C)$  of the consequent, and thus cannot cancel it. (39) sounds very odd and its oddness is debited to preservation of a presupposition which is predicted as being projected under Satisfaction, but should not be projected under Blocking. Ex. (40) is said to project or not to let vanish a potential presupposition that ought to vanish under Blocking.

Turn first to (37), to which (36) is a foil. Soames (1982) claims that the Clausal implicature of ignorance concerning the antecedent  $A_{37}$ ,

(41) Someone at the conference solved the problem,

cannot cancel the logically stronger presupposition of the consequent. Yet, as in the first case, one intuits that the psn is not projected. Soames concludes that Gazdar is falsified. However, to conclude thus, he takes for granted that  $\pi(C_{37}) = \pi(C_{36})$ , i.e. that the presupposition of the consequent of (37) is the same as that of (36), namely

(42) Someone (has) solved the problem.

But this assumption (or any other which makes  $\pi(C_{37})$  logically stronger than  $A_{37}$ ) is unwarranted. To locate the problem, note first a well-recognized anaphoric dependence of the respective  $C$ -clauses

(43) It is Julia who [has] solved it.      [ $C_{36}$ ]

(44) It was Julia who solved it.      [ $C_{37}$ ]

on the  $A$ -clause of each example. Clause-final *it* of  $C_{36}$  and of  $C_{37}$  picks up reference from '*the problem*', which is a constituent of  $A_{36}$  and of  $A_{37}$ . We must resolve anaphora to arrive at a working propositional representation for each of the  $C$ -clauses. These might be indicated well enough by paraphrases

(45) it is Julia who [has] solved that problem.

(46) it was Julia who solved that problem.

Here *that problem* designates rigidly whatever is the problem envisaged in the antecedent. This is readily handled by current semantic theories. But we have not yet eliminated all pronouns. There remains the clause-initial *it* of the  $C$ -clauses, sometimes called 'expletive' or 'dummy' *it*. As the common appellations indicate, it is commonly treated as a semantically redundant exigency of syntax. Its sole extra-syntactic function would be to help indicate non-truth-conditional relations of focus structure whatever they may be.

Still, a more semantically committed view (cf. Atlas and Levinson 1981) might explicate *it* as a variable  $y$  bound in a condition logically equivalent to

$$(47) \exists x[Solve(\zeta, x)] \wedge \forall y[Solve(\zeta, y) \rightarrow y = Julia].$$

Here  $\zeta$  will instantiate to another definite description or will be an individual constant translating e.g. ‘Cantor’s Continuum Problem’. We treat it as a constant for brevity. Russell would have paraphrased (47) as either ‘The one who solved the problem is Julia’ or ‘Julia is the one who solved the problem’ or indeed simply ‘Julia, and no-one else, solved the problem’.<sup>172</sup>

But this is still not good enough. Ramsey (1929b), Kamp (1981) and Heim (1982) have made plain that the role of existential quantifiers in the logical representation of discourse is usually to have ‘dynamically’ extending scope. Accretions to discourse are in general open clauses. Their variables are bound by existential quantifiers whose scope, *ceteris paribus*, extends over the whole of the discourse. We effect insertion of such a quantifier, initial to the logical representation, every time we utter an indefinite, unless such insertion is blocked by a presupposition to the contrary, be it deterministic or probabilistic.

Jespersen (1933), for one, then Strawson (1952) and Heim (1982) have also noted that the usual role of definite descriptions in discourse is to pick up anaphoric reference from a previously introduced indefinite. In our earlier terms, we extend the effective scope of an already inserted quantifier whenever we introduce a definite NP which picks up reference from an earlier indefinite NP. Sometimes we introduce a definite NP without there having been such an introduction in the ongoing local discourse. In this case we attempt to have an existential quantifier ‘accommodated’ and we succeed unless there is an objection, e.g. ‘What do you mean—“the king”?!’

The same principles are at work *en miniature* in conditionals, as shown so perspicuously in the Implicative Conditions of DRT (Kamp and Reyle 1993). Since our presupposition clause, under the Atlas-Levinson construal, is part of the representation of a definite description (albeit statically conceived), there is now a clear policy recommendation. The conjunct clause  $\exists x[Solve(\zeta, x)]$ , which we extracted from the description, will have to be replaced by a formula which is once again open in  $x$ . This variable will be bound by a quantifier which occurs earlier in the discourse than did the minimally scoped operator we removed. The scope of this new quantifier will include the antecedent,  $A$ .

Here is an ecumenical way to state the essential point. The existential clause  $\exists x[Solve(\zeta, x)]$  of our interim representation, which, by assumption,

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<sup>172</sup>(47) exemplifies what the Atlas-Levinson proposal for *it*-clefts amounts to formally, i.e. up to proof- or model-theoretic equivalence. The proposal does not address embedded clefts. Our representation of the example ignores tense marking on the copula. Attention to it will add extra support to the argument conducted below, but would make for notational clutter right now.

was deemed to represent the presupposition, depends on a domain of quantification for  $x$ . Any clause with an  $x$  bound by a logical quantifier does. But in the present instance, this domain will itself be circumscribed by constraints which are imposed by an earlier clause, here the conditional's antecedent,  $A$ . We can also sum up the situation more neatly yet by observing that (36) and (37) are 'donkey' sentences (cf. Geach 1962:128). This has a simple consequence, as can be seen from the following minimal pair of examples:

(48) If someone owns a donkey, he beats it.

(49) If some(one who is a) farmer owns a donkey, he beats it.

Whichever formal policy we choose for pronominal anaphora resolution,<sup>173</sup> it must ensure that 'he' in the first case might be *any one* owning a donkey, while in the second case 'he' might be *any farmer* owning a donkey, though not just anyone at all. I should say that allegedly expletive or dummy 'it' in (36) and (37) picks up reference from the antecedent in a like manner.<sup>174</sup> But this means that, in (37),  $C_{37}$ , here repeated as

(50) It was Julia who solved it

must be

(51)  $\exists x[AtTheConference(x) \wedge Solve(\zeta, x)] \wedge \forall y[Solve(\zeta, y) \rightarrow y = Julia]$

In something like Russell's paraphrase style, the import of  $C_{37}$  is 'The one at the conference who solved the problem is Julia'. Concomitantly, the presupposition clause  $\pi(C_{37})$  paraphrases to

(52) Someone at the conference solved the problem.

But this, now, is identical to the antecedent  $A_{36}$  of (36). Accordingly, the Diffidence Clausal of the conditional construction can block projection of

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<sup>173</sup>Discourse referents for indefinites, implicitly bound by dynamically scoped existential quantification or, as Frege would have proposed, universal quantification with scope over both clauses.

<sup>174</sup>As Josef Bayer and Ellen Brandner of Konstanz University have pointed out to me, Bennis (1986) and Napoli (1988) argue on syntactic grounds prepared by Chomsky (1981), i.e. during his post-'Aspects' period, that expletive 'it'—for which the 'ambient' it (Bolinger 1973) of weather sentences 'It's hot enough here to boil the tourist like an egg' will be paradigmatic—is 'thematic', roughly: something that can be an agent or patient. The key criterion is an ability to control a hidden variable PRO. I should expand then: any pronoun which can do something representable in this manner will have concomitant deictic and anaphoric potential.



$\pi(C_{37})$ . The absence of such a projection is indeed intuited. Soames' observation that no presupposition is projected is correct, but the argument conducted on its basis is invalid. It rests on a cognitive illusion of context-invariance which a working user of dynamic semantics ought not to fall prey to. Persistence of the illusion is perhaps best explained by a syntactic theory being tacitly presupposed which takes 'dummy *it*' to be an informative description. This will stand in the way of recognizing that '*it*' is an indexical expression, always.<sup>175,176</sup>

In return, the example also suggests that a unified account of presupposition and overt anaphora is preferable to one that is not so unified. Yet, if our investigative focus is the meaning theorist's equivalent of the substantive 'context of justification' as distinct from the heuristic and procedural 'context of discovery', we can still treat the Blocking account on its own merits, as I propose to do.

Regarding example (38), the charge against it remains the same as against (37).<sup>177</sup> A like misconception must be checked for, then. But, unlike (37), (38) sounds rather weird. This could hardly be due to the very unexceptional sentence presupposition which the filtering/satisfaction account predicts: that  $A_{38}$  ('John has twins') materially implies  $\pi(C_{38})$ , namely that

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<sup>175</sup>Van der Sandt (1988:159) observes that contrastively stressed 'If *someone at the conference* solved the problem, ...' preserves (42) as a presupposition. This is predicted by all accounts, a paraphrase being 'If it was someone at the conference who solved the problem, it was Julia who solved it'. (42) is now projected from the antecedent  $A$ , being a presupposition of it and therefore unattained by the diffidence clausal of  $A$ .

<sup>176</sup>A recognition of this fact in the present instance will also be hampered by inattention to tense. Anaphoric dependence of the consequent on the antecedent in (37) differs in important respects from that in the nomological donkey example. The simple past tense of the copula in 'it was Julia...' establishes temporal anaphora to the past tense of the antecedent (Partee 1973), whose intended time interval is not simply the whole past, but the time of the conference. A broadly similar argument, though now for a maximal time interval in the relevant past, might yet be made for a variant of (36) that preserves the present perfect of its antecedent in the consequent. This argument will be obscured when the auxiliary *has*, which would be required by sentence-internal consecutio temporum, is being omitted as it is in Soames' 1982 version (his ex. 10a, adopted by Kadmon 2001). If you listen to this mixed tense variant, you will surely find that it wants anaphora to prior discourse, e.g. to *Someone at the conference solved the problem*. No trans-sentential anaphora is needed for Soames' 10b *Someone has solved the problem, and it's Julia who has solved it*. Establishing the right relation between the time of the presupposition (usually glossed in the perfect) and of the assertion (often in the simple past or present) is known as the 'binding problem', but the present considerations apply well before we come to a technical solution or meet obstacles to it.

<sup>177</sup>(38) is credited by Heim (1983) to Stanley Peters with referral to Soames. I have not found it in Soames (1982). Perhaps Peters and/or Heim considered it a variant of (37) which is indistinct from it for all theoretical intents and purposes, as Kadmon indeed does consider it to be.

John has children. Alongside the unpredicted feeling of weirdness, perhaps underlying it, I also observe a strong intuition that an utterer of (38) seems to be assuming that twins are *not* a subkind of children.

And indeed, they are not. Many twins live to a ripe old age. But someone's twins are a subset, proper or not, of their children. So the example should, in theory, remain usable. We might (might!) even feel confident enough to intuit, in specification of our first intuition report, that the utterer of (38) is assuming that someone's twins are not their children. Nonetheless, to add variety and minimize the risk of intensional artefact, let us also consider

(53) If John keeps cats, Mary will not like his animals.<sup>178</sup>

We find a similar strangeness and a compensating, remedial yearning to project ourselves to a world in which cats are not animals. But, unlike the Peters- Heim-(Soames?) original, (53) mellows more readily into acceptability within our world even without such a contra-lexical assumption. We obtain this kind of jejeune acceptability for (38) and (53) via three kinds of readings paired with discourse contexts.

The first kind is a case of zero accommodation, indeed anaphora. There are several reasons why it has not found mention in the literature. For one—and this may already be a sufficient reason—, it is not a problem for any theory of projection. Next, it wants conclusive priming by an explicit prior discourse contribution which makes it common ground that John has children (38) or keeps animals (53) and which also affords a reason for using the possessive definite description *his children* rather than a pronoun *them*.<sup>179</sup> Finally, the priming context must be reflected in the very prosody of (38/53). Main stress will have to fall on *like*, since *his children* must undergo anaphoric destressing. Once all these discourse-syntactic requirements are satisfied, we also want accommodation (or else a subsequent explanatory statement) of a causal doctrine held either by the speaker or by Mary or both. For (38) this will presumably be a doctrine to the effect that twins among one's offspring are like bad apples in a whole barrel-full of apples. Strange, but easily imputed.

Next, there is a whole class of possible or rather attemptable readings which attend (38/53) when they are uttered with default prosody, i.e. main stress on *children* and in the usual experimental zero or near-zero context. All of these attempts fail in one way or another. The most successful of them, strangely enough, has the most obvious defect. This is the contralexical

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<sup>178</sup>Keeping animals, for speakers of Southern British English and probably for others, too, entails ownership or possession.

<sup>179</sup>Example primer for (38): *Mary will at long last meet John's children and their pets.*

interpretation which makes the set of John's twins (cats) disjoint from the set of John's children (animals).

If we satisfy its underlying urge legally by substituting 'pets', 'dogs' or suchlike for 'twins' in (38), the sentence is fully acceptable. It is clear that John's having children is projected.<sup>180</sup> All we have to do is to accommodate or otherwise supply imputation of a doctrine to Mary or to the speaker that will warrant the relevance requirement of antecedent to consequent. For instance: Mary doesn't like pet animals and thinks that children turn out to be like their parents' pets. Analogous observations follow for variants of (53).

What proponents of the accommodational view of presupposition will learn from, say,

(54) If John keeps dogs, Mary will not like his children.

is that someone's having children is most readily accommodated under experimental, virtually 'zero-context' conditions. Gazdar, of course, would have argued that this is unsurprising: projection is blocked only by the threat of inconsistency. Moreover, our earlier anaphoric example if not the general theory of anaphora will tell us that (38) (just as (53)) is in no way a counterexample to his Blocking (cancellation/suspension) doctrine.

Gazdar's account predicts that (38) cannot carry a presupposition that John has twins (if having twins implies having children). But not having twins does not rule out having children. So Gazdar, interpreted model-theoretically as was his express intent, will predict that 'John has children' is projected, and ought therefore to be a presupposition of (38), *ceteris paribus*.<sup>181</sup> And this does appear to be the case, provided we are charitably reconstitutive when faced with a speaker who has ineptly or perversely chosen expressive tools which are ruled out on grounds independent of Gazdar's explanatory aspirations and obligations.<sup>182</sup>

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<sup>180</sup>Accommodated, if you are a proponent of presupposition as accommodation.

<sup>181</sup>The actual proposal to make use of this model-theoretic interpretation and thus extend Gazdar's logico-syntactic account of cancellation seems to be due to Landman or van der Sandt. For a proponent of an idealized justification view of presupposition this will be a natural stance to adopt, crediting language users with unbounded inferential capacities and leaving bounds as something to be discovered as a performance constraint. There are drawbacks to treating performance as one's pragmatic wastebasket. The response would be to have layers of competence, a descriptive tactic advocated in the late 1970s by Steve Isard, now of Edinburgh University.

<sup>182</sup>Test yourself: if you heard sentence (38), were assured by an indemnity clause of its truth, were advised to ignore the utterer's kinky use of English, and then had to decide on that basis whether or not John has children, how would you decide? How for *If John keeps cats, Mary will not like his animals* ?

(38) is weird, as (54) is not, because it violates basic rules of usage on referential pickup. There are two specific ways to try and read the sentence if one assumes that someone's twins are children of theirs. The first reading would have John's twins co-extensive with his children, if any twins he has. This is the reading which is parallel with the warranted reading of (37). The other reading would have the twins as a proper subset of his children.<sup>183</sup>

On the first reading, the presupposition would *not* project under Gazdar's account. But if this special case obtained, for whatever reasons, say for reasons similar to those which gave us the correct presupposition for (37), only an aleck too smart to be bound by rules of anaphora would avoid the pronoun *them*. Unless one's intention is to mislead, one is inept in choosing instead for anaphoric pickup a semantic superordinate or near-superordinate of the antecedent noun.<sup>184</sup>

This leaves the second reading as a more civil alternative. If John's hypothetical twins were to be a proper subset of John's children, then Gazdar's account would predict projection of 'John has children'. This seems indeed to be the reading forced by avoidance of pronouns, given a standard lexicology for 'twin'. But note that, on any model-theoretic or inferentially closed semantics for presupposition, we still cannot presuppose the existence of twins that are children of John's. All we can presuppose is the existence of other children. So our sentence remains weird and the Blocking/Justification account, coupled with the routine injunction to say what you mean if you can, tells us why.

We can check that this is so by asking ourselves how competent speakers of English would resolve the problem. The answer is that they would presumably do so in line with the justification account's prediction. Depending on what precisely is intended, the civil kind of utterance will be one or the other of

- (55) a. If John has twins, Mary will not like them, nor his other children.  
b. If John has twins, Mary will not like his other children.

We must still impute fairly unconventional dispositions to Mary to call these sentences true, but we need not doubt the speaker's command of English. In each case we preserve the intendable presupposition that John has children which are not twins. The sets of twins and non-twins are, of course, disjoint. To sum up on an interim basis: one should be overconfident to think with Kadmon (2001:138) that (37) and (38) already suffice to show

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<sup>183</sup>For variety, repeat with ordered pair (cats, animals) in place of (twins, children).

<sup>184</sup>Recall the note on twins. Terminology:  $\alpha$  is a superordinate of  $\beta$  iff  $\beta$  is a hyponym of  $\alpha$ .

the insufficiency of free accommodation subject to Blocking by ‘cancellation’ as a projection policy.

Example (39) is harder. The sentence is weird, no doubt, and so is our routine test variant

(56) If John keeps animals, Mary will not like his cats.

Peters’ and/or Heim’s explanation (related by Heim 1983 and thence by Kadmon) is that (39) suggests that it is a matter of course that,

(57) If someone has children, (s)he will have twins among them.

This is a weird thing to take for granted. Under the Satisfaction account, (39) presupposes that ‘John as children’ materially implies ‘John has twins’ and Heim’s claim is that this predicts just the suggestion. This is not obvious to all, and without further assumptions it is a non-sequitur. (57) is a lawlike generalization. It can be equivalently stated as

(58) Having children implies having twins (among them).

But the predicted psn, under Frege’s minimally artefactual paraphrase of  $A \rightarrow C$  as  $\neg(A \wedge \neg C)$ , is

(59) It is not the case that both of ‘John has children’ and ‘John doesn’t have twins’ are true.

There is no nomological component intuitable. Moreover, we cannot simply replace the material conditional (MC) by another conditional. MC is motivated in the satisfaction theory by its specific informativeness properties. Nothing else is. Gazdar does not predict (57), but neither does the Satisfaction account. Peters-Heim hold that Gazdar must predict that  $\pi(C_{39})$ , the ppsn) that John has twins, is cancelled (i.e. blocked). Yet the intuition of (57) is clearly discernible and it persists under Ramsey-denial of the whole conditional  $A > C$ , which amounts to assertion of  $A > \neg C$ :

(60) If John has children, Mary will like his twins.

On this interpretation of denial, (57) is a presupposition of the whole conditional sentence (39).

However, it will not be a psn of (39) if we treat  $A > C$  and therefore (39) as material implication, and its denial as its boolean negation. In this case, the denial commits the denier to maintaining,  $A \wedge \neg C$ . Granted preservation of  $\pi(C)$ , this would presumably predict a paraphrase

(61) John has children and Mary will like his twins.

The putative nomological presupposition is not preserved, but this sentence is fully acceptable.

If the effect or intent of denial were to deny the causal or evidential link between *A* and *C*, this psn would, by assumption, not be preserved either. Specifically,

(62) Even if John has children, Mary will like his twins

would at best preserve an intuition that John's having children is *ceteris paribus* positively relevant to Mary not liking his twins, though pre-empted by other factors (see Bennett 1982, Merin 2002a). The nomological component even in the *ceteris paribus* assumption would seem faint, if indeed there was such a component at all. Most importantly, however, the sentence, though mellifluous, turns out to be sheer non-sense once we try to make sense of it. A necessary condition for making sense of it appears again to be that we change the lexicography of 'twins' or 'children' so as to make their present extensions disjoint. Substitute 'birds' or 'living room' for 'twins', and watch sense re-appear. The nonsense that appears under denial with added antecedent *even* is a sure sign that the sentence is profoundly defective, and for reasons which Gazdar is under no obligation to supply.

Here is my best explanation for what is going on. The presupposition of the consequent, that John is known to have twins, is inconsistent with the intimation (a probabilistic presupposition by the lights of a DTS) of the conditional that it is not known whether John has children. By Gazdar's account, the former is not added to the context of the speaker's commitments. In our present terms, it cannot become a joint, interpersonal commitment. But what, then, is the possible conversational contribution of the sentence? On Gazdar's account, its assertoric component should be the material conditional

- (63) a. John's having children will materially imply that Mary will not like any children he has that are twins *i.e.*  
b. It is not the case that John has children and that Mary will like those among them that might happen to be twins.

Its further contribution would be the Clausal that it is not known whether John has children nor whether Mary will like children of his that are twins if he has any. The first observation to make here is that cancellation of the presupposition of the consequent transforms the propositional instantiation of the consequent  $C_{39}$  of (39) in our working sentential calculus, namely '*Mary will not like his [i.e. John's] twins*' into a material conditional whose usual, but overly relevance-presuming paraphrase is

- (64) a. If John has children, Mary will not like any children he has that are twins or  
 b. If John has children, Mary will not like those {of his children/among them} that are twins.

In second-order predicate calculus (quantifying over sets  $X$ ), we should translate to either of the two equivalent formulae

- (65) a.  
 $\forall X[ChildrenOfJohn(X) \rightarrow (Twins(X) \rightarrow \neg(MaryWillLike(X)))]$   
 or  
 b.  
 $\forall X[ChildrenOfJohn(X) \wedge Twins(X) \rightarrow \neg(MaryWillLike(X))]$

But this means that, under the same paraphrase regime, the assertoric contribution of the sentence after cancellation of the presupposition will be

- (66) If John has children, then if John has children, Mary will not like any {of them/children he has} that are twins.

Suppose we adopt a propositional representation by instantiating pronominal elements, as we always may at some risk of missing an interpropositional connection. We may surely do so if we accept what Gazdar, along with the pragmatics literature adapting Grice and along with DRT, presumes, namely that the rules of projection make reference to meaning representations which are somewhat more “surfacey” (Gazdar) than bare model-theoretic truth conditions.<sup>185</sup> Then our assertoric contribution is a material conditional of form

- (67)  $A \rightarrow (A \rightarrow C)$ .

That formula is truth-conditionally equivalent to plain  $A \rightarrow C$ . But this means that its antecedent  $A$ , which stands for the  $A_{39}$ , cannot be relevant to the consequent  $A \rightarrow C$ , which interprets the import of  $C_{(39)}$ . Now, in probabilistic terms this condition will be satisfied at a given context only if one or both of  $A$  and  $A \rightarrow C$  have unit or zero probability there. But the

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<sup>185</sup>There is by tendency a contradiction between this approach and the model-theoretical, i.e. (for practical purposes) unboundedly inferential approach to meaning that I have appealed to before, presumably alongside Landman or van der Sandt. Both aspects play a role in meaning and the problem goes back at the very least to the discussion into which Carnap introduced his notion of ‘intensional isomorphism’ (Carnap 1954). So this is a very general problem and everyone is negotiating their ground when faced with it.

Diffidence condition (or the Interclausal Relevance condition) on conditionals rules out this case. Hence, the sentence is predicted to be inadmissible in a DTS which conservatively extends Gazdar's conditions.

Gazdar's scheme is not designed to say anything about the periphrastic intuition that Peters picks up. This is that the speaker seems to presume that having children entails having twins among them. This presumption is intuited by Peters and/or Heim [PH] as being the principal presupposition of (39). Its weirdness as a presumption is held to account for the weirdness of the sentence, so by Heim (1983) and by Kadmon (2001).

However, as we have noted, and contrary to what PH assume, this nomological condition is not captured by the material implication  $A \rightarrow \pi(C)$  which the Karttunen-Heim [KH] theory of context-incrementation predicts as the presupposition of *If A, (then) C*. All we can say is that the putative presupposition is an instance, by universal specification, of such a law if that law is given. Yet, in a liberal spirit, we might argue as follows: The KH presupposition is itself in need of justification. Accommodation of a law by which it is entailed as an instance will provide the justification required. This account is not identical with the KH theory, in which a nomological justification of the presupposition plays no role. So we should conclude that the material implication  $A \rightarrow \pi(C)$  here happens to co-incide with the putative KH presupposition, but is not, in any theoretically relevant, intensional sense what the latter purports to be.

For the PH sentence (39), we find that our present world offers plenty of counterexamples to a putative natural law or regularity that anyone having children will have twins among them. So we cannot expect such a law to be accommodated.<sup>186</sup> But now consider a sentence such as

(68) If Mr. T writes a text on enlightenment or any other topic, the readership will not be amused by his footnotes on football.

This sentence<sup>187</sup> goes down as smoothly as Zabaglione, even though its structure is, in all relevant respects, that of the PH sentence.<sup>188</sup> The reason

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<sup>186</sup>This might change. Suppose continued growth in environmental pollution will be encouraged by assiduous deregulation, and a putatively associated reduction in male fertility will be compensated by routine hormonal treatment administered to women intending to bear children. Treatment, it seems, works by reducing rejection rate prior to gestation and, when successful, very often results in the development of  $n$ -tuplets ( $n \geq 2$ ).

<sup>187</sup>In all essentials identical to a culinary example, roughly: '*If Mary cooks a meal, John will not like her apple crumble*', first proposed by Fabienne Martin of the Free University of Brussels. The modification is designed to minimize stereotypicality and thus to control for this extraneous explanatory variable.

<sup>188</sup>With *like* in place of *be amused by*, the sentence is marginally less smooth. Similarly, the PH sentence improves a little under the inverse substitution. I have no ready explanation for this.



seems to be that we can readily accommodate a *lex T*, presumably induced from the speaker’s lengthy experience, to the effect that Mr. T never fails to include footnotes<sup>189</sup> on football in any text he writes. An experientially induced meta-law—now also warranted under the addressee’s experience—to the effect that people tend to have typical, regular idiosyncrasies of conduct which they can usually get away with, will, in turn, make plausible the accommodation of such a law *ad hominem*.<sup>190</sup>

The absence of an overwhelming body of counterexamples—such as there are to the putative law that all parents have twins among their children or have twins for children—is a necessary condition for accommodation of a law warranting the conditional. So, in this very general respect, Gazdar’s idea of consistent incrementability is seen to be at work. But this general respect is not the only respect in which it applies. To see more, suppose we are licensed to accommodate the pertinent instance of the general law intuited. Then the assertoric contribution of the HP sentence, *apud* Gazdar, will transform the context into one which verifies ‘*If John has twins, Mary will not like {them/these twins, which he has}*’. At this point cancellation/suspension applies.

This description of phenomena associated with the Peters sentence (39) is far from being the first one there is. In some respects it resembles the hybrid accounts which originate with Soames (1982) and which are developed, discussed, and finally dismissed in Kadmon (2001:6.3). (Soames had opted for cancellation followed by application of the Karttunen rule.) However, the present account differs from Soames’ and from other accounts that have been considered not only in being longwinded, but also in several theoretical respects.

First, the instance of the putative  $A \rightarrow \pi(C)$  presupposition rule for conditionals is accommodated *ad hoc* to the particular choice of conditional, here (39). The reason for diagnosing *ad hoc* status of Peters’ presupposition is twofold. Most familiarly, there is no empirical base in semantic intuitions for assuming that an instance of such a presupposition schema is projected for all indicative conditionals. More interestingly, we find that accommodation in the present example can succeed only if the accommodatum is justified as a universal specification instance of a law whose accommodation, in turn, satisfies the nearest proper probabilistic generalization of Gazdar’s consistency rule. There is no motivation for such a nomological requirement in the Karttunen-Heim rule and in its information-incremental justification, which simply motivates a plain material implication  $A \rightarrow \pi(C)$ . The phenomenological discrepancy between Heim’s report of the presuppositional

<sup>189</sup>I.e. a subset of the set of text strings.

<sup>190</sup>Call this an instance of *higher-order stereotypicality*.

intuition, which is nomological, and the predicted Karttunen-Heim presupposition is an additional indicator of this fact.

Secondly, the particular class of examples is such that its instances will, under a Blocking regime operating on propositions (i.e. sets of worlds), generate an interpretation for the conditional in which the antecedent, under the most conservative probabilistic extension of Gazdar's scheme, is irrelevant to the consequent.

Thirdly, this interpretation is inconsistent with each of the interclausal relevance requirement on conditionals and the Frege/Gazdar local ignorance condition.

Fourthly, when the accommodatum is successfully accommodated, it transforms the assertoric import of the sentence into one in which the antecedent is no longer irrelevant and in which Gazdar's cancellation/suspension rule can apply.

Fifthly, we assume that an attempt to accommodate the accommodatum is a strategy choice prompted by the diagnosis of irrelevance, which makes the utterance unacceptable, and by the envisaged therapeutic success of the prospective accommodatum.

Having considered the case where accommodation is licensed and having seen the theoretical reasons for unacceptability of the Peters sentence schema where accommodation is not licensed, we return to the shipwreck of comprehension which the Peters sentence itself constitutes.

What we hear are bits of wreckage knocking against each other. There appears to be a clash of presupposition or intimations (Landman 1986). The consequent seems to demand that it be common ground (or speaker's knowledge) that John has twins. The antecedent seems to demand the contrary. But we cannot from this conclude that Gazdar's priority regime has been falsified as a description of the facts. We need not even conclude that we are hearing a bark without the bite of illicit projection of  $\pi(C)$ . The fact is rather that the design of (39) precludes that it is an acceptable word string of English in our world. This world falsifies the lawlike generalization that alone could license the accommodatum required to fill the justificational vacuum which is the central design feature of (39).

A similar, though much simpler observation holds for Landman's putative counterexample, (40) now with 'contextualized discourse' taking the place of 'word string'. Recall that Landman asks you to assume that a country cannot have both a president and a king. Next, you are to learn vocally that, if Beneficia has a president, he lives in the palace. At this point, I suggest, you collect your information under inferential closure. Thus, we state your current commitment: 'If Beneficia has a president, he lives in the palace and Beneficia has no king'. Now you hear 'The king of Beneficia did

not come out of his palace yesterday to make a speech'. Landman intuitively for (40) an inconsistency between the intimation of uncertainty about Beneficia having a king and the presupposition that Beneficia does have a king. Kadmon intuitively that the latter prevails and is projected. One might yet agree with her, but only because overt denial of an existence presupposition by appeal to wide-scope negation is such a doubtful affair.<sup>191</sup>

But one should not agree, because the discourse is still weird. To make (40) acceptable (and, to this end, adapting a routine observation familiar from the literature) we should have to insert a fully assertoric statement such as

(69) In fact, Beneficia does have a king, as I just {remember/hear}.<sup>192</sup>

Even then we are not done. Pick-up from the indefinite by means of a definite 'the king ...' is not fully acceptable when no other noun phrase marked for masculine gender intervenes. If we thus continue acceptably 'He did not come out of his palace yesterday ...' we are on track to sense. We might extend the discourse to a purposeful argument, e.g. by continuing 'This is what might have given the impression that ...because ...'. At any rate: with (69) in place, there is no longer a problem for the Blocking account.

Bad cases make bad law. If one must turn to word strings unacceptable on independent grounds to find a possible counterexample to the cancellation account, it is doing well. Its normative bias is seen to be working. It prevents an assumption, that Beneficia has a king, from being accommodated as a discourse presupposition, because prior commitments should not allow it to be accommodated. The assumption would have to be properly asserted, with reasons given both for the prior show of ignorance and for subsequent insight.

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<sup>191</sup>It takes a hamfisted sort of smart aleck to state 'The king of France is not bald: there *is* no king of France'. The least one wants for civility is '...can't (possibly) be bald ...'. However, (40) also involves inferencing of the kind which some periodicals perhaps still ask their readers to undertake in the recreational section, paper and pencil to hand. Thus, Kadmon's intuition might have been conditioned by performance bounds on short term memory. Our reconstruction of (40) is designed to avoid this possible source of artefact, which Landman himself, who surely knew his example by heart, did not apparently succumb to.

<sup>192</sup>That Beneficia is a monarchy must be hot news to the speaker, else the earlier conditional would have to be subjunctive and thus unable to cancel the original putative ppsns. Or else there must be a change of speaker and we should insert (69') *But Beneficia does have a king*. If we forego negation in the final sentence of (40), we could economize by making it *But in fact, the King of B. came out of his palace yesterday ...*

## 2. An Artefact of Unrecognized Blocking

It has been argued that even ‘hard core’ presuppositions (in Kadmon’s taxon (i)) are not always preserved in all the standard diagnostic contexts for presupposition status. If true, this would surely work to undermine the claim to empirical purchase which any rational theory of presuppositions finally makes. The theory would have no models in natural language, only more or less distant approximations to such models.

Kadmon (2001:172f.,219) offers two kinds of examples, both involving conditional antecedents.<sup>193</sup> One kind will be of interest here.<sup>194</sup> It is exemplified by

- (70) If Bill lost his entire fortune at cards, for example, that would explain why he looks so upset.

The analyst’s presupposition is that ‘*Bill {has/had} a fortune*’, which is uncontroversially associated as a ppsn with the possessive definite NP ‘*his entire fortune*’, is a ppsn of the antecedent. The claim is that it should be projected (under any of the familiar theories of projection), but that phenomenologically it isn’t. I see nothing wrong with the ultimate phenomenological judgment. But the first part of the claim is false because the analyst’s presupposition is false.<sup>195</sup>

Part of the antecedent is the insert, ‘*for example*’, and it is an essential part of the sentence in the sense that its deletion will significantly reduce if not indeed extinguish our inclination or willingness to intuit that the ppsn is not projected.<sup>196</sup>

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<sup>193</sup>There are also putative “disappearance”(s)—not my quotes—of such presuppositions in simple affirmative examples. To the extent that there are intuitions that might fit the description, they may rest on a confusion concerning the nature of presupposition, whose use in conveying new information, new in c-time that is, has often been noted. But this need not affect the status of presuppositions as ostensibilia in e-time.

<sup>194</sup>The other kind has for its principal example ‘*If Sue stopped smoking, she’ll get a prize from the health bureau*’. Its import rests on a claim, which I cannot replicate, that no broadly anaphoric priming is needed to ensure non-projection of a presupposition that Sue had been smoking. However, with priming (e.g. by ‘Anybody who stopped smoking was to get a prize’), there appears to be a non-presuppositional reading. My feeling is that in this case we can interpret the antecedent as ‘If Sue is someone who stopped smoking’ with suitable indexical reference to a given time. The priming effect may also hold up for the present perfect form ‘has stopped’.

<sup>195</sup>So Russell would surely have expressed himself, and rightly so, since presupposition and claim are both affirmative.

<sup>196</sup>My hedge ‘significantly reduce’ is motivated by two facts. The first is simply that we are now faced with the phenomenon of experimental hysteresis. The reading derived from the unexpurgated example lingers in mind as a cue to be accessed by familiar psycholinguistic processes. This response bias can be controlled for by controlled experiment. The

But note now that this insert makes the antecedent clause in effect disjunctive. We could substitute for it, without loss of meaning, ‘or if his TV broke down, or ... [etc.]’ (preserving the example’s tense). What we substitute is immaterial. What alone matters, and is guaranteed by the mere license to substitute, is that the speaker is not certain of which contingency would make the antecedent true if it were true. This is a Clausal presupposition. The Blocking theory will thus predict that neither the antecedent nor, hence, the conditional as a whole will presuppose that Bill ever had a fortune to lose or keep.

### 3. Beaver’s Putative Counterexamples to Blocking

Beaver (1999) offers a range of examples which, he maintains (at p. 29), are not only counterexamples to the approaches of Heim (1983) and van der Sandt (1992), but even more irremediably so to that of Gazdar. I will show that latter objection is unwarranted precisely to the extent that its concomitant judgment of a poor prognosis for remedy (*loc.cit.*) is false. In most respects, the deficiencies of the alleged counterexamples are those which we have already found in Kadmon’s subsequent survey and so we should use what is largely recapitulation to emphasize some points of general theoretical import.

Gazdar’s theory attended to purely propositional relations and so took a wholly informal approach to pronominal or inflectional anaphora. Its policy for implementation would presumably have been to exercise routine care in the translation from intensional, indexical predicate languages, or from their nearest natural neighbours, to propositional languages. The theory

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second fact is that the example is a mix of what might be a counterfactual antecedent, but turns out to be a simple past antecedent when we have read the whole why-clause, and an academic counterfactual-of-diffidence consequent. Some contamination of the antecedent by a counterfactual reading cannot be excluded and counterfactual antecedents are known to reduce projective potential. Secondly, the simple past, too, reduces projective potential. My guess is that something like Kamp’s (1979) topological theory of tense/aspect will be part of a full explanation. More simply, however, counterfactuality and simple past share the *-ed* morpheme in English, which Isard (1974) glossed by a feature ‘remote’. The sentence

(71) If Bill has lost his entire fortune at cards, that will explain why he looks so upset, which is neither more nor less acceptable than Kadmon’s example, does not have an intuitable reading in which the ppsn is not given ostensible common ground status. No doubt you can work to undo this status even here, but this is something you can do with any presupposition that can be put in words. The theory of presupposition in natural languages is a theory of *Smooth Operators*—define as: update functions of context whose execution ostensibly requires no explicit warrant and no noticeable exertion—, not of absolutely undeniabiles or of absolutely givens.

also paid no attention to world-knowledge-based inferences, which go under the rubric of ‘bridging’ when they are being treated as accommodata.<sup>197</sup> On this count, the policy decision was clear. One could treat in a reasonably algorithmic way those fragments of English discourse which did not call out to the swamplands of world knowledge for their intelligibility, let alone draw one into the whirlpool of highly parochial world knowledge. But this forbidden pleasure is what we must now indulge in. Consider Beaver’s objection advanced with respect to

(72) If Jane takes a bath, Bill will be annoyed that there is no more hot water.

(73) If Jane wants a bath, Bill will be annoyed that there is no more hot water.

The objection is that Gazdar does not predict that (72) carries a suggestion<sup>198</sup> expressed by the conditional sentence

(74) If Jane takes a bath, there will be no more hot water.

Instead, it will predict a suggestion of

(75) There is no more hot water.

This suggestion is what it would also predict for (73), but now felicitously so. In each case, the suggestion, (75), is a presupposition by Gazdar’s uncontroversial taxonomy.

But the relevance of the objection rests on shaky grounds. And if its reticence on the taxonomic status of the ‘suggestion’ were to be taken as license to explicate ‘suggestion’ as ‘presupposition under traditional invariance tests’—which could make the objection in parts a serious one—it would still remain uncertain, on that count.

Here are the shaky grounds. The inferential process triggered by the interclausal relevance requirement on typical conditionals starts presumably with asking oneself (implicitly or openly) why *A* should be a reason, indeed a sufficient reason, for *C*. The simplest, evident answer, given the data and default prosody (main stress on ‘water’) has two components: (i) that Jane’s

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<sup>197</sup>Nor to the role of the latter in resolution of the former. In the 1970s, the sentence ‘He put down the bottle on the table, and it broke’ was a commonplace among students of cognition. Their answer to the problem which it posed was either to reduce their ambit to toy worlds and toy scenarios, or else to apply their energy to things other than natural language.

<sup>198</sup>I take Beaver’s term ‘suggestion’ to be a phenomenological observation term, synonymous with the term ‘intimation’ which I use to such effect.

taking a bath, as anyone's taking a bath at her usual fill would, will use up the hot water and (ii) that John, like anyone, is apt to be annoyed at being faced with a depleted resource.

But whom is the answer simple and evident for? Part (ii) of it is covered by the semantics of 'annoy' and 'no more'. Some modest appeal to knowledge concerning general aspects of human nature is needed, but this part will be evident to any competent speaker of English. The indispensable part (i), by contrast, will be evident only to a small and select audience. Its typical representative will be an inhabitant of a geopolitical constituency, lower and middle income Utopia—in brief: economy class Utopia—, who has not opted for the third way of life, the life outdoors.

Utopia is a country, long industrialized, where unlimited domestic hot water supplies are unheard of among the economy classes. The home of the indoor economy class Utopian has a tank that feeds the bath tap. The tank, which gets heated up by an electric or gas/oil-fired heating system, is small and the caloric power of the heating element is smaller yet. Given this piece of vital statistics (and never mind the sequence of events in c-time by which we call it to mind), we can, and must, perform universal instantiation for the constant 'Jane' in our parochial generalization about domestic water economics. Assuming that Jane and Bill share an economy class residence, we obtain (74).

In the first, liberal sense of presupposition which I, for one, advocate in the main text, (74) will indeed be a presupposition of the utterance of (72), falling into Kadmon's taxon (iv). But it will be intimated, irrespective of what we call it, only among residents of a country which economizes on the hot water supply to some or all of its population, or among those non-residents who have undergone hermeneutic immersion into their mind set. In large parts, say, of Western Continental Europe as well as among Utopians who have been able to confine their minds and bodies to business class living, intimation (74) ought not to arise. To accuse Gazdar of insensitivity for failing to be insular seems a little forward.

Neither does there attach great theoretical interest to (74) when it does arise.<sup>199</sup> In doxastic terms, it is a parochial, culture-specific piece of background knowledge or belief. If we disregard all parochial stereotypicity, on the absence of which the Peters-Heim sentence (39) also plays, it has a status much like the ad hoc hypotheses which had to be imputed in one variant or another to Mary, the child-detester of example (38). Indeed, domestic background knowledge, coupled with an awareness of the limited nomolog-

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<sup>199</sup>Some non-negligible theoretical interest may, however, attach to its dependance on a nomological construct, in line with an unsurprising observation to be made in Section 4 below.

ical scope of the stereotype that might warrant (74), may supply quite a different context for (72). This context, too, will relieve the *horror vacui* inspired by a need for PICR, the positive interclausal relevance requirement on typical conditionals; but it will do so without intimating (74).

Here is our context. Jane, who comes from a business class environment, is Bill's date for tonight. The speaker knows, and Bill has heard, that Jane does have her rebellious days. On those days—days when she believes in the free expression of natural pheromones—she does not take a bath, and accordingly, being the fairminded individual she is, will not be averse to meeting a person who is in a similar bodily condition. But perhaps today is not one of her rebellious days, in which case she will indeed take a bath. 'Will she or won't she?', the speaker of (72) has been left wondering. The speaker is aware, too, that Bill is a member of the economy classes who lives just opposite Jane, on the shady side of the street, but with an assiduously exploited view of Jane's double-glazed, business size bath chamber; and that Bill's grandmother, a keen bather, has just used up the hot water in the tank.

The phenomena are saved—for the hearer of (72). Clearly, there is no intimation of (74), and there is an intimation of (75). An inspired guess by a stranger to Utopia who overhears (72) and wants to make sense of it may supply yet a different context, one that makes no appeal whatsoever to Utopian nomology. (Exercise!) So all we are left with at the end of the day, whichever story we pick, is an observation to the effect that background knowledge plays a vital role in the interpretation of language.

The misplaced objection to Gazdar might still be interesting, however, if a case was made that, at least under the parochial conditions which warrant its assumption, (74) was a presupposition in the narrow, traditional, logico-linguistic sense which is defined by invariance under denial and which is routinely adopted by the projection literature. So suppose that we have hermeneutically transformed ourselves into economy class Utopians and intuit (74) loudly and clearly on hearing (72). We are thus back in the world where 'Jane' denotes the person who shares an economy class residence with Bill. Now we deny (72) with

(76) It is not true that, if Jane takes a bath, Bill will be annoyed that there is no more hot water.

We find that (74) is intimated only to the extent that we steadfastly hold on to it and admit no exception. If we happened to be uncertain about whether Bill and Jane live economy class rather than business class, (74) should be part of a disjunctive intimation, the other disjunct being the negation of (74). So we cannot claim that (74) is a presupposition of (72) in this



traditional sense. To see things more clearly, let us avoid the periphrastic, philosophy-class negation employed in (76). On the default, antecedent-preserving interpretation of denial of conditionals, one whose unstilted paraphrase introduces no syntactic entities save negation items, (76) will paraphrase to

(77) If Jane takes a bath, Bill won't be annoyed that there is no more hot water.

The statutory requirement that the antecedent be a sufficient reason for the consequent applies because no causal impossibilities stand in its way. Now, unless we prefix an 'even' (which by assumption we do not), we understand that Jane's taking a bath will reconcile Bill with the absence of hot water, an absence that is now intimated outright and not conditionalized on Jane's taking a bath.

One may feel that this denial should not be allowed as an example because the meaning of (77) seems a bit odd. But it is odd only if we are stuck to the intimation of (74). To recognize contingency on this intimation and, once again, the contingency of the intimation itself is easy. Suppose, consistently with (77), that we have just heard that Jane—still the Jane living with Bill—has an opportunity of taking a bath at her parents' home where she is now and from where she is due to return soon. Suppose further that Bill has used up all the hot water at his and Jane's economy class residence and that the pair of them are due to meet a seriously rich aunt with keen senses and just as keen a sense of propriety. Then (77) makes sense, not least because it makes both economic and business sense. But note that under these conditions we cannot retain (74) as an intimation.

Next suppose that we choose to deny (72) under use of *even if*, i.e. so as to have a paraphrase

(78) Even if Jane takes a bath, Bill won't be annoyed that there is no more hot water.

Here the most likely reading is again one in which (75), exhaustion of water in a relevant residence, is intimated outright. What differs now is that Jane's bath is presented as a *prima facie* reason for Bill getting annoyed at the water shortage, though it is also presented as a reason which is, *secunda facie*, insufficient for him getting annoyed. We have no problem finding a context to satisfy these requirements of relevance. We revert back to our first excursion into mixed class relations. Jane is business class Jane, she is Bill's date for tonight, and she has been very rebellious of late. As before, Bill's grandmother has used up the hot water, but now Bill himself is a firm believer in the irresistible power of natural pheromones: *his* pheromones.

Again, in this context, whose social and topographic coordinates are the same as in our first inter-class encounter, and which must be kept constant to make the denial test meaningful, (72) cannot coherently intimate (74).

An economy class resident of Utopia might yet reply that (74) is to be read simply as a material implication  $A \rightarrow \pi(C)$  and is preserved under denial whenever  $\pi(C)$ , i.e. (75), is projected by the denying sentence, since  $\pi(C)$  logically entails  $A \rightarrow \pi(C)$ . This is not, perhaps, what the naive idea of preservation of a presupposition is about, but it would be formally impeccable. I am not entirely sure whether the bare material implication reading of (74) should be conceded. However, I do concede it if the parochial nomological warrant for it takes the well-understood form of a universal sentence  $U =_{df} \forall x[Ax \rightarrow Dx]$ , perhaps with some further bound variables, here suppressed.

Sentence  $U$ , or the proposition corresponding to it, will be to the effect that anyone (any  $x$ ) taking a bath will use up the hot water in the tank feeding the tub they ( $x$ ) are using. In this case, modulo some banal semantic sugaring where other bound variables might come in, the relevant substitution instance by universal specification will be a singular material implication sentence,  $Aa \rightarrow Da$ . However, this would hold up only when the nomological constraint is a deterministic context-presupposition.

For reasons much discussed in the philosophy of science,<sup>200</sup> the way we should represent the nomological, universalistic constraint is not as  $P(\forall x[Ax \rightarrow Dx]) = 1$ , but rather as  $\forall x[P(Dx|Ax) = 1]$ . In this case we can infer<sup>201</sup>  $P(Da|Aa) = 1$ , which entails  $P(Aa \rightarrow Da) = 1$ . Analogously, granted that our probability function is ‘symmetric’ (i.e. invariant under permutations of individual constants) we should infer from a properly probabilistic nomological presupposition  $\forall x[P(Dx|Ax) \in [\alpha, \beta]]$  (where  $0 < \alpha \leq \beta < 1$ ) to  $P(Da|Aa) \in [\alpha, \beta]$ . But this will not entail  $P(Aa \rightarrow Da) \in [\alpha, \beta]$ . Conditional probabilities and probabilities of the material conditional coincide only at the extreme values. So if our background knowledge entails that, for any  $x$ , this  $x$  is more likely than not, or likely to within certain bounds of probability, to exhaust the hot water supply when taking a bath, we cannot infer directly a like material implication

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<sup>200</sup>See Carnap (1950) on ‘instance confirmation’ and the large literature on assigning probabilities to universal empirical laws. The most relevant reason here is that we prefer to think that any individual we might come across is likely or certain to have such and such a property rather than that it is likely or certain that any individual we might come across has the property. We are not really interested in the probability of a putative universal law being true, but in the probability of any given instance of it being true. Substitutional interpretations for quantification into intensional contexts (which is what probability functions create) are available.

<sup>201</sup>See Merin 1996; 1999: Sec. V for conditions.

constraint. A reply might be that we accommodate the instance, i.e. raise the contextually warranted probability  $P^j(Da|Aa) \in [\alpha, \beta]$  retroactively to  $P^j(Da|Aa) \in [1, 1]$ , i.e. to unity. So the material conditional should be conceded as a presupposition only in the orthodox parochial case—which is presumably the case envisaged by our Utopian objector. But orthodoxy has a limited ambit even in Utopia, and we have indeed seen mixed examples which do not phenomenologically speak for accommodation of (74) as a certainty. Thus, I judge its narrowly presuppositional status—even in Utopian contexts—uncertain.

Gazdar will, of course, correctly predict that (73) does intimate (75). The prediction may seem accidental, but its persistence under moves to bring to bear further background knowledge on its interpretation is not accidental. With (73), we are still in economy class, but now there is no likely causal link between the antecedent  $A_{73}$  and  $\pi(C)$ . So the interclausal relevance requirement will lead us to construe a link to the assertion component of unembedded  $C$ . Jane's wanting a bath must bring it about that Bill is annoyed at a fact he would otherwise live with.<sup>202</sup> So we are right to treat the fact as presupposed.

We now recall that Gazdar will block projection of  $\pi(C)$  only if  $\neg K(A)$  entails  $\neg K(\pi(C))$ , given the prior context. (We do not simply have entailment on the empty context as our suspension criterion!) But if this entailment holds,  $A$  must be relevant to  $\pi(C)$ . A positive constraint that  $A$  is irrelevant to  $\pi(C)$ , here imposed by narrowly lexical knowledge and by broader world knowledge, precludes blocking. It ensures that no 'bridging' assumptions can be accommodated into the context which would make the entailment go through. To charge Gazdar's account with lack of subtlety for failing to pick up the difference between (72) and (73) seems to rest on a misperception of contextual dynamics and of what constitutes parochial world knowledge.

The second class of Beaver's putative counterexamples fail under the rubric of classical indexicality:

- (79) a. It is unlikely that if Spaceman Spiff lands on Planet X, he'll notice that he weighs more than on Earth.  
 b. If Spaceman Spiff is in our solar system, he'll land on Planet X and will notice that he weighs more than on Earth.

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<sup>202</sup>The context is routine. Bill has gone out on a blind date with Jane, here a certain Jane from the suburbs, who may or may not be from the business classes. The date has gone well so far, Jane has replied 'Yours' to the last open question; but she, too, may be a keen bather, keen in particular—to the point of insistence—on the bath before bedtime; and the hot water supply will not recover from grandma's bigger splash until the morning.

- c. If Spaceman Spiff lands on Planet X and notices that he weighs more than on Earth, he'll radio home about it.

The factive's ppsn, uncontroversially, is

- (80) Spaceman Spiff weighs more than on Earth.

Gazdar's prediction, so Beaver's claim, is that (80) is projected. Beaver says it should not be, and I agree with his phenomenology to the extent that there are readings of (79a), (79b) and (79c) which do not carry the intimation that (80) is true. There are, of course, readings that do carry (80) and which are indeed secured by having prior text in which (80) is established. But what is at issue is an alleged inability of Gazdar's approach to filter out (80) under any conditions. So the non-projective readings must be taken seriously. Yet, the claim that Gazdar must fail to predict them ought not to be granted.

Spaceman Spiff is much like Julia the theorem-prover. If we instantiate our temporal indexicals in (79a), (79b), and (79c) as routinely as we do with the personal pronoun, we have unity of time, place, and action. The time-place regions indexed by the inflections of *lands*, *weighs*, and by the cliticised auxiliary *-ll* are one and the same, give or take inessential differences between their topological set-union and set-intersection. If we instantiate to obtain the propositions that we want for working purposes,<sup>203</sup> we obtain a reading whose most economical of revealing paraphrases is

- (81) If Spaceman Spiff lands on Planet X, it is unlikely that he will notice that he weighs more there than he would weigh, or now weighs, on Earth.

Weighing there means being there. Spiff has not been introduced as a theoretician, but as a creature of the senses with a significant discrimination threshold. Were it otherwise, the antecedent would be pointless and the conditional unacceptable. Weighing 200 pounds on Planet X therefore means what boxers, jockeys and their hangers-on would express by 'weighing in at 200 pounds on Planet X'. Hence, uncertainty about Spiff being there, on Planet X, means uncertainty about him weighing—there and then!—a number of kiloponds in excess of the amount he would weigh, or now weighs, on Earth. (79b) and (79c) respond similarly to diagnostic *there*-insertion.<sup>204</sup>

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<sup>203</sup>The forthright alternative to such pragmatic atomism (cp. Fodor & Lepore 1992) is a giant, holistic, unwieldy Ramsey sentence for the whole discourse (Ramsey 1929b).

<sup>204</sup>On the relevant formal properties of *now* and, by implication, *there*, see Kamp (1971).

#### 4. Lessons, if any

Examples and counterexamples draw on a stock of current intradisciplinary folk wisdom. So it would be hasty to assume that the counterexamples advanced in two of the most comprehensive recent surveys of the subject,<sup>205</sup> and their common failings, cannot be due to a common cause which is less impressive than the inconceivability of any better founded counterexample would be. But the burden of proof rests with the critics of the Blocking/Cancellation account.

If there are any positive findings to report from this Appendix, there will be two of them. The first is a fairly unsurprising

OBSERVATION: World-knowledge-based bridging accommodata must be licensed as substitution instances by universal specification of presupposed general laws, be they deterministic or probabilistic, which have the status of Aristotelian *endoxa*, i.e. widely shared beliefs. These laws may, in some cases, themselves be accommodata, licensed in their turn as substitution instances of more general laws which might be called meta-laws.

The second finding is induced from the observation as a

HYPOTHESIS: General laws of either kind are convictions *a priori* by one or both of two criteria. (I) They will be 'gnomic'<sup>206</sup> convictions transmitted and acquired in a manner for which proverbs are paradigmatic. (II) They will be generalizations induced from, or otherwise representing, long-term accumulated prior experience. Exposure to gnomic lore and to long-term experience may be assumed sufficiently uniform among participants to a conversation. It follows that the anteriority requirement on presuppositions will be plausibly satisfied. More importantly, the ostensible uncontroversiality requirement on potential accommodata will be plausibly satisfied. General laws have the status of *reminders* if they are made explicit. If they remain implicit, their explicit singular substitution instances are reminders of the laws licensing them. Examples of the latter are assertions of singular conditionals  $A > C$ . Anteriority status is inherited by such reminders from their licensing laws. Finally, there are singular conditionals derived from endoxastic laws which are themselves inexplicit, and hypothesized

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<sup>205</sup>I treat Beaver (1997, 1999) as one composite contribution.

<sup>206</sup>See Lyons (1977:681).

in typical ‘stereotypicity’ accounts of ‘bridging’ phenomena. The same considerations on anteriority and uncontroversiality apply.

This kind of presupposition will usually be what Kant (1787:B2) had in mind for knowledge which is sometimes referred to as a priori but which is *not properly or fully* a priori. (And which he was not going to be concerned with.) If you had undermined the foundations of your house, says Kant, you may be told that you could have known a priori that it would collapse. But, of course, your general knowledge that bodies are heavy and will fall when bereft of their support must have become known to you by experience. So here one is speaking of a priori knowledge in the sense of knowledge which is derived, not from immediate experience of the eventuality in question, “but from a general rule which, nonetheless, has itself been derived from experience”.<sup>207</sup>

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<sup>207</sup>The present paper is No. 114 in the series *Forschungsberichte der DFG-Forschungsgruppe ‘Logik in der Philosophie’*, University of Konstanz, 2003. A shorter version, No. 109 in the series and entitled ‘Probabilistic and Deterministic Presuppositions’, will appear in R. Bäuerle, U. Reyle, and T.E. Zimmermann (eds.) *Presuppositions and Discourse*. Amsterdam: Elsevier, 2003/2004.

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