# Hebrew *kol*: a universal quantifier as an undercover existential[1]

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**Abstract.** Constructions containing the Hebrew determiner *kol* have a prominent interpretation as involving universal quantification. In light of this, it has traditionally and almost unarguably been considered to be truth-conditionally a universal quantifier. The goal of this paper is to argue that contrary to the widely accepted analysis, *kol* is an existential quantifier and that the universal import of constructions containing *kol* results from grammatical strengthening. Such an argument is backed by *kol*'s interpretation in Downward-Entailing environments, its behavior as a Free Choice item and more importantly, its indefinite interpretation in interrogatives. The proposal is carried out using a mechanism of exhaustification and the assumption that *kol* is special among existential quantifiers in lacking a scalar (i.e., universal) alternative.

**Keywords:** Quantification, Alternative semantics, Exhaustification, Grammatical Strengthening, Hebrew, *kol*, Negative Polarity, The grammatical view of scalar implicatures.

## 1. Introduction

The Hebrew determiner *kol* has a prominent interpretation as a (distributive) universal quantifier. This can be seen in the following examples (for convenience, we label this interpretation U-*kol*).

(1) (etmol) *kol* yeled ciyer et acmo b-a-maxberet Selo
(yesterday) *kol* boy drew ACC self in-the-notebook his
*(Yesterday,) every boy drew himself in his notebook.*

(2) *kol* yeled higi'a
*kol* boy arrived
*Every boy arrived.*

In light of typical examples such as these, *kol* has traditionally and almost unarguably been considered to be truth-conditionally a universal quantifier.[2]

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[2]Note that the very Hebrew term for *universal* – *kolel* or *klali* – is an adjectival form of *kol*.

The goal of this paper is to argue that contrary to the widely accepted analysis, *kol* is an existential quantifier whose universal import is a result of strengthening.

In section 2 below we provide data showing that in Downward-Entailing and Free-Choice contexts, *kol* has an interpretation that challenges the traditional view, and that parallels with Negative Polarity and Free-Choice Items (NPIs, FCIs), such as English *any*. In section 3 we discuss a potential analysis that maintains universal truth-conditions for *kol*, according to which it always takes wide scope, yielding the desired interpretations; we reject such an analysis on the basis of *kol*'s behavior in interrogatives. In section 4 we present our proposal, according to which *kol* is an existential quantifier that (i) obligatorily undergoes grammatical strengthening, and (ii) introduces domain alternatives but lacks scalar alternatives. In section 5 we suggest a way to incorporate our proposal in a general theory of polarity sensitivity along the lines of Chierchia (2013) and discuss several open issues. Section 6 concludes the paper.

## 2. *Kol* in Negative Polarity and possibility modality contexts

### 2.1. The NPI-like behavior of *kol* [=NPI-*kol*]

As we have seen in (1)-(2), U-*kol* can be described as a parallel of English *every*. Interestingly enough, in DE environments *kol*'s interpretation parallels with that of *any* (for convenience, we label this interpretation NPI-*kol*):

(3) lo nigram *kol* nezek
NEG was.caused *kol* damage
*No damage was caused.*

(4) sarat ha-miSpatim hitnagda Se-yevuca *kol* Sinui be-takciv beit
minister the-law objected that-will.be.performed *kol* change in-budget house
ha-miSpat ha-'elyon
the-court the-supreme
*The minister of justice objected to performing any change in the budget of the supreme court.*

(5) ha-mu'amad lo kibel *kol* tSuva
the-candidate NEG received *kol* response
*The candidate did not receive any response.*

(3), for instance, is not translated into *it is not the case that every damage was caused* but rather into *it is not the case that any damage was caused.* If *kol* is indeed a universal quantifier, that might be surprising.

Such data call for a non-trivial modification of the traditional analysis. That is, if one is to take a naive view, according to which *kol* is a plain universal quantifier, one needs to explain why only the [$\forall > \neg$] readings in (3)-(5) should result, in spite of surface structure being of the form [$\neg > \forall$].[3]

An example to such a modification is found in Doron and Mittwoch (1986)'s treatment of *kol*, cited in Francez and Goldring (2012). Considering examples such as (3), Doron and Mittwoch (1986) submit that in certain cases *kol* is an NPI.

Note that if one is to analyze NPI-*kol* as an existential quantifier, one could keep the surface structure and derive the aforementioned interpretation, due to the equivalence between [$\forall > \neg$] and [$\neg > \exists$].[4] Before elaborating on this issue, let us consider the related phenomenon of Free-Choice-*kol*.

## 2.2. Free choice inferences with *kol* [=FC-*kol*]

In addition to U-*kol* and NPI-*kol*, a further interpretation of *kol* is that found with possibility modals, which is evident in (6) (we label this interpretation FC-*kol*):

(6) yosi raSai le'exol *kol* ugiya
yosi is.allowed to.eat *kol* cookie
*Yossi is allowed to eat any cookie.*

In (6), we infer that Yossi is free to choose whatever cookie(s) he wants to eat. As in the case of NPI-*kol*, we can see here a similar pattern to that of English *any*. Assuming that *kol* is a universal quantifier, we would have expected it to yield an interpretation compatible with that of *every*, according to which the given permission is to eat *all* the cookies [$\diamond > \forall$].[5]

[3] Assuming, for the case of (4), that the predicate *object* scopally-interacts with *kol* in a way similar to that of negation.

[4] This has been proposed by Levy (2008). See our discussion of her proposal in 5.2.1. This point can be seen as echoing the long lasting debate about the quantificational force of *any*. See Quine (1960); Klima (1964); Ladusaw (1980); Krifka (1995) and references therein.

[5] A question may arise as to whether or not Yossi is allowed to eat all of the cookies, and not just choose between them. See discussion in 4.2.3 below.

## 3. Reconsidering the universal analysis of *kol*

### 3.1. An immediate analysis: wide scope universal

How could the traditional universal analysis of *kol* be reconciled with the data on NPI-*kol* and FC-*kol*? A potential unified account might be that *kol* has the semantics of a universal quantifier and that it obligatorily takes wide scope.

*Kol*'s universal semantics is then reflected trivially in the cases of U-*kol*, such that (7a) is the LF of (2). NPI-*kol* is derived by the universal scoping above DE operators present in the LF, forming (7b) for (3). Similarly, FC-*kol* would be derived by scoping *kol* above a possibility modal, yielding (7c) as the result of (6).

(7) a. *kol* boy arrived
$\forall x[boy(x) \rightarrow arrived(x)]$
b. [*kol* damage]$_x$ **NEG** was.caused $x$
$\forall x[damage(x) \rightarrow \neg(was.caused(x))]$
c. [*kol* cookie]$_x$ **allowed** yossi eat $x$
$\forall x[cookie(x) \rightarrow \diamond(eat(x)(yossi))]$

This account remains within the lines of the traditional view, assumes a unified universal semantics for *kol* and thus derives U-*kol*, NPI-*kol* and FC-*kol* altogether. However, such a solution runs into a major problem in predicting *kol*'s interpretation in questions, as discussed in the following lines.

### 3.2. Problem: interpretation in interrogatives

Consider the following context:

(8) a. **Context:** A governmental office is waiting for three responses to three questions it has sent out. An hour ago, the first response has arrived. No additional responses have arrived.
In this context, the following question is asked:
b. ha'im hitkabla *kol* tSuva?
Q was.received *kol* response
*Was any response received?*

Given the context in (8a), the answer to (8b) is positive. If *kol* is a universal quantifier, no matter what scope it takes in (8b) and under any semantics of questions of which we are aware, such a response is not predicted.

We have seen that in UE contexts *kol* behaves like a universal quantifier and yet that in DE contexts it is problematic to think of it in such terms. We have shown from questions that a solution in terms of a wide scope universal won't explain the data. However, if one were to assume that *kol* has the truth-conditions of an existential quantifier, its behavior in interrogatives and DE contexts would straightforwardly follow.

In the next section, we put forward our proposal, which is based on this assumption and an adoption of a mechanism of strengthening. We claim that such an analysis explains *kol*'s interpretation in DE and modal contexts, and furthermore, that it derives *kol*'s universal import in UE episodic contexts.

## 4. Proposal: strengthened existential

### 4.1. Assumptions

#### 4.1.1. Exhaustification

Exhaustification, an operation of grammatical strengthening, has been proposed for explaining phenomena like Scalar Implicatures, Free Choice inferences and Polarity Sensitivity (Krifka (1995); Chierchia (2006, 2013); Fox (2007), a.o.).

An exhaustivity operator is a covert counterpart of *only* which takes two arguments: a proposition (the PREJACENT) and a set of alternatives, and returns the prejacent conjoined with the negation of all alternatives that are non-weaker than the prejacent.

To force the exhaustivity operator to negate only a proper subset of the non-weaker alternatives, in order to avoid contradictions, we follow Fox (2007) in defining the exhaustivity operator EXH in the following way, using the notion of Innocent Excludability (IE):[6]

(9) a. $[\![\text{EXH}]\!](Alt(p))(p)(w) \Leftrightarrow p(w) \wedge \forall q \in \text{EXCLUDABLE}(p, Alt(p))[\neg q(w)]$
When $Alt(p)$ is the set of alternatives of the prejacent $p$.

b. $\text{EXCLUDABLE}(p, Alt(p)) = \bigcap\{Alt(p)' \subseteq Alt(p) : Alt(p)'$ is a maximal set in $Alt(p)$, s.t. $\{\neg q : q \in Alt(p)'\} \cup \{p\}$ is consistent$\}$

[6]See also discussion in section 5.1.

The formula in (9a) reads: the exhaustification of a proposition $p$ and a set of ($p$'s) alternatives $Alt(p)$ is true in a world $w$ if and only if that proposition is true in that world and every alternative member in the set of EXCLUDABLE alternatives is false in that world. (9b) reads: the set of EXCLUDABLE alternatives, given a proposition $p$ and a set of ($p$'s) alternatives $Alt(p)$, equals to the intersection of all maximal sets of alternatives in $Alt(p)$ whose negation is consistent with the prejacent $p$.

We further assume, also following Fox (2007), that exhaustification applies recursively until no additional strengthening occurs (that is, until applying EXH any number of times would not provide additional information).

#### 4.1.2. The semantics of *kol*

We propose that *kol* has the truth-conditions of a plain existential quantifier:

(10) $[\![kol]\!](P)(Q) \Leftrightarrow \exists x[P(x) \wedge Q(x)]$
(for any $P$ and $Q$ of type $< e, t >$)

In accordance with the similarity between *any*'s and *kol*'s behavior in DE and FC contexts (section 2), we suggest a solution that utilizes theories of NPIs and FCIs. We thus propose that *kol* requires to be in the scope of an exhaustivity operator (as in the analysis of Polarity Sensitive Items (PSIs) like *any* in Chierchia (2006, 2013)).

A second way in which *kol* is like PSIs is, we submit, in that it introduces alternatives that cannot be pruned (i.e. neglected; see Chierchia (2013) and Ivlieva (2013)). The assumptions above mean that *kol*'s alternatives, when excludable, will always be negated by the exhaustivity operator it requires.

The set of alternatives associated with *kol* contains its DOMAIN alternatives. The set of domain alternatives of the prejacent contains propositions that differ from it only in having a domain of quantification which is a subset of the domain in the prejacent.

(11) $Alt([\![kol]\!](P)(Q)) = \{\exists x \in D'[P(x) \wedge Q(x)] : D' \subseteq P\}$

A crucial part of our proposal is that *kol*'s set of alternatives, unlike in the case of many PSIs, does not include a SCALAR alternative, namely the universal quantifier.

(12) $[\forall x[P(x) \to Q(x)]] \notin Alt([\![kol]\!](P)(Q))$

Intuitively, keeping the scalar (i.e., universal) alternative out, would save it from being negated by EXH. In this way, we can have a chance to get a universal meaning for *kol* at the end of the computation. The discussion in what follows provides an argument for the claim that lacking a scalar alternative is not implausible, based on conjunctive strengthening of disjunctions.

#### 4.1.3. Disjunctions with conjunctive meaning

Model-theoretically, existential quantification can be put in terms of disjunction, and universal quantification – in terms of conjunction (at least over finite domains). Since we propose that *kol* is an existential quantifier, let us build on this parallelism with disjunction and mention three other cases in which strengthening disjunctive constructions leads to conjunctive (universal) interpretations.

It has been argued that sentences with disjunctive constructions can sometimes get conjunctive interpretations. First, a familiar case is that of Free Choice disjunctions:

(13) You are allowed to eat ice cream or cake.
- a. $\rightsquigarrow$ You are allowed to eat ice cream.
- b. $\rightsquigarrow$ You are allowed to eat cake.

The inferences in (13a)-(13b) correspond to the two disjuncts in (13), which is surprising given that an expression of the form $\diamond(a \lor b)$ is expected to have a meaning weaker than $(\diamond a) \land (\diamond b)$, namely that of $(\diamond a) \lor (\diamond b)$. The proposal in Fox (2007) is that disjunction can get grammatically strengthened into conjunction if some existential operator (*allowed* in (13)) takes scope over the disjunction and under two exhaustivity operators.

In addition, it has been argued that even simple unmodalized sentences with disjunctive constructions sometimes also end up with a conjunctive meaning. Singh et al. (2012) report that children reject sentences of the form in (14a) if the statement in (14b) is false.

(14)
- a. The monkey is holding a flower *or* a book.
- b. The monkey is holding a flower *and* a book.

This is taken to be evidential for arguing that children actually interpret (14a) as adults would interpret (14b).

Finally, Meyer (2011) discusses examples such as (15), in which both inferences in (15a)-(15b) are present, in spite of (15) being of the form of a disjunction.

(15) Bernadette must be rich or else she wouldn't own a Porsche.
  a. $\rightsquigarrow$ Bernadette is rich.
  b. $\rightsquigarrow$ If Bernadette wasn't rich, she wouldn't own a Porsche.

In both cases it has been proposed that the observed conjunctive interpretations result from strengthening (i.e., exhaustifying) disjunctions whose set of alternatives lacks scalar (i.e., conjunctive) alternatives. Similarly, we propose that *kol* is an existential quantifier that lacks scalar (i.e., universal) alternatives and thus may get strengthened to receive a universal meaning.

## 4.2. Application

### 4.2.1. U-*kol* as a strengthened existential

How can the assumptions we made explain the different interpretations of *kol* in different environments as we have seen in our data? In what follows we present a brief derivation for every such environment.

The most problematic case, given our assumption that *kol* bears the semantics of an existential quantifier, is that of U-*kol*. Specifically, how can an existential quantifier have a universal import in upward entailing environments? The derivation in (16) shows how it happens, according to the proposed analysis.

The simplified LF in (16) is the relevant representation of the sentence in (2) based on the assumption that the EXH operator occurs as many times as needed for adding more information. In this case, even though applying EXH to the prejacent once will not give us more information, applying it twice would. Applying it more than twice will be again uninformative, so the relevant LF based on our assumption has two EXH operators as in (16).

(16) EXH EXH *kol* boy arrived
  a. $D = \{yossi, john\}$.
  b. $a :=$ yossi arrived; $b :=$ john arrived
  c. $[\![$*kol* boy arrived$]\!] = \exists x[boy(x) \wedge arrived(x)] \equiv a \vee b$
  d. $Alt([\![$*kol* boy arrived$]\!]) = \{a \vee b, a, b\}$
  e. $\text{EXH}_{Alt(a \vee b)}[a \vee b] = a \vee b$
  f. $Alt(\text{EXH}_{Alt(a \vee b)}[a \vee b])$

$= \{\text{EXH}_{Alt(a\vee b)}[a \vee b], \text{EXH}_{Alt(a\vee b)}[a], \text{EXH}_{Alt(a\vee b)}[b]\}$
$= \{a \vee b, a \wedge \neg b, b \wedge \neg a\}$

g. $\text{EXH}_{Alt(\text{EXH}_{Alt(a\vee b)}[a\vee b])}[\text{EXH}_{Alt(a\vee b)}[a \vee b]]$
$= (a \vee b) \wedge \neg(a \wedge \neg b) \wedge \neg(b \wedge \neg a)$
$= (a \vee b) \wedge (a \rightarrow b) \wedge (b \rightarrow a)$
$= (a \vee b) \wedge (a \leftrightarrow b)$
$= a \wedge b$

First, for expository reasons, assume a toy model of two boys, Yossi and John, as in (16a). The relevant sentences for deriving the alternatives, $a$ and $b$, are defined in (16b).

The semantics of the prejacent of (the low) EXH is shown in (16c) and is equivalent to $a \vee b$ in our toy model due to the equivalence between disjunction and existential quantification. The set of alternatives for (16c) is in (16d): the prejacent itself, which is $a \vee b$, and the domain alternatives *kol* introduces, $a$ and $b$. Note that crucially the scalar alternative $a \wedge b$ is absent from this set, in accordance with our assumption that *kol* does not introduce scalar alternatives.

The result of applying EXH once with respect to the set of alternatives in (16d) is in (16e) (the set of alternatives appears in subscript). Since no alternative is excludable, the output of applying EXH equals to its input – the prejacent.

However, the set of alternatives of this very sentence, namely of EXH *kol boy arrived* ((16e)) is different from the one in (16d); this set is provided in (16f). Here the alternatives are identical to (16e), except for the domain of quantification which is a subset of our D in (16a). This identity is the reason why the EXH in each of the alternatives in (16f) operates with respect to the set $Alt(a \vee b)$, that is, the one in (16d). The set in (16f) thus turns out to contain the original sentence ($a \vee b$), and in addition, 'only $a$' ($a \wedge \neg b$), and 'only $b$' ($b \wedge \neg a$).

Applying EXH for the second time, this time with respect to the set of alternatives in (16f), yields (16g). The derived meaning is, roughly, *a or b, and not only a, and not only b*, which is equivalent to $a \wedge b$. We have started with a disjunctive assertion, equivalent to an existential one, and ended up with a conjunctive meaning, that is – a universal meaning. This is due to our assumptions: (i) that *kol* is an existential quantifier, (ii) that it is obligatorily exhaustified, and (iii) that it introduces domain alternatives but not scalar alternatives.

#### 4.2.2. Deriving NPI-*kol*

To explain the data of NPI-*kol* we only have to show that exhaustification does not do any harm to the assertion, since assuming *kol* is an existential quantifier and keeping surface structure would straightforwardly yield the desired meaning.

In DE-environments no alternatives of the prejacent are non-weaker (i.e., all are entailed), since negation over an existential quantifier constitutes the strongest member on the scale. Because of that, no strengthening occurs and *kol* remains existential.

(17) is the LF of (3). Here applying EXH once would suffice because applying it more times will have no additional effect. The truth-conditions of the basic statement with no EXH are in (17a) (assuming again a toy model, with a domain containing two entities). The set of alternatives is shown in (17b), and the result of applying EXH with respect to that set of alternatives is in (17c).

(17) EXH NEG was.caused *kol* damage

a. $[\![$NEG was.caused *kol* damage$]\!] \equiv \neg(a \vee b)$
b. $Alt([\![$NEG was.caused *kol* damage$]\!]) = \{\neg(a \vee b), \neg a, \neg b\}$
c. $\text{EXH}_{Alt(\neg(a \vee b))}[\neg(a \vee b)] = \neg(a \vee b)$

4.2.3. Deriving FC-*kol*

The analysis suggested here for FC-*kol* is almost identical to that of Fox (2007) on Free Choice inferences: disjunctive items could be strengthened without contradiction to conjunctions when in the scope of an existential operator. The derivation in (18) is very similar to the one in (16) and goes along the same lines.

(18) EXH EXH yossi may eat *kol* cookie

a. $D = \{cookie_1, cookie_2\}$
b. $a :=$ yossi eats cookie$_1$; $b :=$ yossi eats cookie$_2$
c. $[\![$yossi may eat *kol* cookie$]\!] \equiv \diamond(a \vee b)$
d. $Alt([\![$yossi may eat *kol* cookie$]\!]) = \{\diamond(a \vee b), \diamond a, \diamond b\}$
e. $\text{EXH}_{Alt(\diamond(a \vee b))}[\diamond(a \vee b)] = \diamond(a \vee b)$
f. $Alt(\text{EXH}_{Alt(\diamond(a \vee b))}[\diamond(a \vee b)]) = \{\diamond(a \vee b), (\diamond a) \wedge \neg(\diamond b), (\diamond b) \wedge \neg(\diamond a)\}$
g. $\text{EXH}_{Alt(\text{EXH}_{Alt(\diamond(a \vee b))}[\diamond(a \vee b)])}[\text{EXH}_{Alt(\diamond(a \vee b))}[\diamond(a \vee b)]]$
$= \diamond(a \vee b) \wedge \neg((\diamond a) \wedge \neg(\diamond b)) \wedge \neg((\diamond b) \wedge \neg(\diamond a))$
$= \diamond(a \vee b) \wedge ((\diamond a) \leftrightarrow (\diamond b))$
$= (\diamond a) \wedge (\diamond b)$

In light of the computation in (18), the following example may seem puzzling:

(19) ata yaxol lavo *kol* yom
you may to.come *kol* day

a. *You may come any day.*
b. *You may come every day.*

In line with what we saw in example (6), the reading in (19a) represents the inference that the addressee is free to choose whatever day(s) on which he comes. However, prima facie it might seem that (19) has yet another interpretation, (19b), according to which the addressee can come on each and every day. This interpretation would be problematic in light of our discussion of the FC-*kol* data, suggesting that *kol* in modal contexts does pattern like *every*.

One way to go is to assume that (19b) is a reading of (19), different from (19a) in being the result of applying EXH under the modal: *may* EXH EXH *you come kol day*, resulting in $[\diamond > \forall]$, that is, the *every*/U-*kol* reading. (19a) would then be analyzed as EXH EXH *may you come kol day*, yielding the *any*-meaning similar to FC-*kol* in (18).

However, another possibility is to maintain a single representation of (19), namely EXH EXH *may you come kol day*. Note that differently from Fox (2007)'s analysis, since in the current analysis *kol* lacks scalar alternatives, the scalar implicature that $\neg \diamond (a \wedge b)$ is not predicted to arise in such cases, as can be seen in the computation in (18). This prediction may get some evidence from examples like (19), if we take (19b) to not be a distinct reading of (19), but merely truth-conditionally compatible with FC-*kol*'s strengthened meaning.

If so, what seems to be two different readings of (19) is not the result of a true ambiguity but rather two context-determined options which are derived from the same truth-conditions. The reason for the absence of the *every* reading from sentences such as (6) would be our world knowledge which suggests that it is not likely that we are allowed to eat all of the cookies; that is, it is a true pragmatic inference.

## 5. Discussion

### 5.1. Embedding in a general theory of PSIs – presuppositional exhaustification

A few crucial assumptions made here are couched in a general theory of polarity sensitivity, following Krifka (1995); Chierchia (2006, 2013); mainly, the assumption that there are lexical elements which have to be in the scope of an exhaustivity operator, e.g., English *any*, which is a basic assumption that brings about the ungrammaticality of such elements in UE environments.

However, assuming Innocent Excludability, as in (9), won't derive contradictions for items like *any* in UE environments, contradictions which are crucial in explaining the distribution of such items within the theories mentioned above. We would like to argue that there is a way to reconcile the general theory of polarity sensitivity with Innocent Excludability and by that to implement our analysis under its broad wings.

As discussed in Fox (2007), defining the exhaustivity operator without IE leads to some inevitable contradictions, which are unwanted on empirical grounds. For example, if the prejacent is of the form $\alpha \vee \beta$ , then the set of alternatives includes the prejacent and $\alpha \wedge \beta$ , $\alpha$, and $\beta$. Apart from the prejacent itself, each of the alternatives is logically stronger: they asymmetrically entail the prejacent. Therefore, the prediction would be that $\text{EXH}[\alpha \vee \beta]$ entails $(\alpha \vee \beta) \wedge (\neg\alpha) \wedge (\neg\beta) \wedge (\neg(\alpha \wedge \beta))$, which is a contradiction, and also does not correlate with the observation that in sentences such as *Sue ate cake or ice-cream*, an implicature that *Sue didn't eat both* is the only one that arises.

Therefore, unless one is to make some additional assumptions, IE is a crucial notion for theories of exhaustification. Our goal would be then to keep EXH's definition as in (9), i.e., with IE, and to find an alternative way to rule-out the ungrammatical sentences which the general theory of PSIs explains by deriving contradictions.

An idea on which a solution could be based is to add a presupposition to the exhaustivity operator, as in (20). In this we follow Danny Fox (p.c.) and modify a suggestion discussed by Chierchia (2013).

(20) Presuppositional exhaustivity operator (revised version of Chierchia (2013, p. 186)):

$$\text{EXH}_{\text{PR}_{Alt(p)}}[p] =$$
$$\begin{cases} \text{EXH}_{\text{IE}_{Alt(p)}}[p] \text{ if for every } q \in Alt(p): \begin{cases} \text{Either: } \text{EXH}_{\text{IE}_{Alt(\text{EXH}_{\text{IE}_{Alt(p)}}[p])}}[\text{EXH}_{\text{IE}_{Alt(p)}}[p]] \rightarrow q \\ \text{Or: } \text{EXH}_{\text{IE}_{Alt(\text{EXH}_{\text{IE}_{Alt(p)}}[p])}}[\text{EXH}_{\text{IE}_{Alt(p)}}[p]] \rightarrow \neg q \end{cases} \\ \text{Undefined otherwise} \end{cases}$$

The presupposition in (20) reads as follows: the exhaustivity operator over a prejacent $p$ with respect to the set of alternatives of $p$ operates with innocent excludability as defined in (9) if for every member $q$ in the set of alternatives $Alt(p)$, applying EXH twice would entail either that $q$ is true or that $q$ is false. Otherwise, applying EXH would be undefined.[7] In other words, the presupposition is that the process of exhaustification must give the *complete answer* to the question provided by the set of alternatives of the prejacent.

A further important assumption here is that there is an underlying difference between alternatives of elements which require to be in the scope of EXH and alternatives of elements which don't; the former are unprunable, that is, they cannot be omitted from the set of alternatives on which EXH operates, whilst the latter can. We thus predict that for every alternative introduced by a Polarity Sensitive Item such as *any*, or *kol* in our analysis, exhaustification must determine its truth-value,

[7]Note that this is not meant to present two different kinds of EXH operators. What appears here as $\text{EXH}_{\text{PR}}$ is the operator used everywhere, and it is defined the way we defined EXH in (9) ($\text{EXH}_{\text{IE}}$ here) if it satisfies the presupposition and is undefined otherwise.

but exhaustification over other elements can leave some alternatives without determining their truth-value due to the possibility to omit them from the set of alternatives.

Such a requirement predicts items like *any* to be bad in episodic UE environments, since exhaustification cannot determine the value of the domain alternatives without excluding them in a way that would violate IE. It also predicts the grammaticality of *any* in possibility contexts since applying EXH twice would entail the truth of the domain alternatives (Fox (2007)), thus satisfying the presupposition. We can thus retain the benefits of theories that have been made for polarity sensitivity, alongside the benefits of IE as used in our proposal on *kol*.

### 5.2. Previous proposals

Some researchers have suggested analyses to account for the distribution of *kol*. Let us briefly discuss two of them: Levy (2008) and Tonciulescu (2011).

#### 5.2.1. Levy (2008): ambiguity approach

Levy (2008) argues that NPI-*kol* and FC-*kol* are existential quantifiers, while U-*kol* must be given a universal semantics. Therefore, according to her, U-*kol* is a universal quantifier which is a counterpart of *every*, while NPI-*kol* and FC-*kol* are (roughly) a counterpart of *any*.

This analysis reflects the intuitions we discussed in section 2, according to which *kol*'s NPI- and FCI-uses would benefit from a theory that states that they have existential semantics. However, in addition to the need to claim that there are two different lexical entries for *kol* that such a proposal raises, an analysis along these lines has to assume that they differ also in their distributional properties. U-*kol* would be an ordinary universal quantifier, while NPI-FC-*kol* would be sensitive to polarity. This account would need to explain why U-*kol* is not available in (3)-(5) by stipulating some ad-hoc distributional rule.

Contrarily, we propose that a unified account is possible, if *kol* is taken to be an existential quantifier, with no need for assuming different lexical entries and consequently no need to assume a principled difference in distribution.

#### 5.2.2. Tonciulescu (2011): universal indefinite

Tonciulescu (2011) suggests an analysis based on Menéndez-Benito (2005)'s analysis for Free Choice *any*. Menéndez-Benito (2005) deals with FCIs like English *any* and its Spanish counterpart *cualquier(a)*. She proposes (following Kratzer and Shimoyama (2002)'s alternative semantics) that *any* is a variable which introduces alternatives under Hamblin semantics, and has to associate with a sentential universal quantifier. Combined with an exclusivity operator similar to EXH defined above, the result is a contradiction in UE episodic contexts, but Free Choice in possibility contexts.

Tonciulescu (2011) argues that *kol* is a pronoun just like *any* in this theory, denoting a set of individual alternatives and agreeing with a (propositional) universal quantifier. In her analysis, even U-*kol* in UE episodic contexts such as (1)-(2) needs to involve (possibility) modality in order to explain its grammaticality in UE episodic contexts.

However, this modality is empirically unjustified, since the cases of U-*kol* in (1)-(2) don't seem to have any modal flavor. In the analysis proposed here, the cases of U-*kol* are not assumed to involve any kind of modality.

### 5.3. Open issues

We would like to briefly mention several matters that pertain to *kol*'s distribution, and especially U-*kol*'s distribution, and which need to be dealt with.

First, throughout the paper we have been discussing cases of *kol* taking an indefinite singular NP. It is important to note that when *kol* combines with a (mainly plural) definite restrictor NP, it is unambiguously universal. Consider the following example, in which, unlike in (3) above, the presence of negation does not prevent *kol* from being universal.

(21) yosi (lo) pagaS et *kol ha*-yeladim
yosi (NEG) met ACC *kol the*-children
*(It is not the case that) Yossi met all the children.*

A possible direction to explain such data is to assume that the semantics of the definite article *ha* is such that applying it on a plural noun results in a singleton set, over which *kol* then quantifies. That is, in (21) *kol* quantifies over the maximal member in the set of (sum-individuals that are) children. This maximal member will be a sum of all the children, and thus it does not matter if *kol* remains existential (e.g., in a DE environment) or gets strengthened into a universal, it will have a universal import.

A different path to take is to stipulate that somehow due to definiteness, there is a requirement according to which EXH must occur low, locally above *kol* that takes a definite NP. This way, whenever *kol*'s restrictor is definite, it will be locally exhaustified and thus strengthened into a universal quantifier, even in DE context.

Aside from sketching these possibilities, we have to leave the question of deciding on their empirical and theoretical consequences for future research.

An additional issue that one should note is that U-*kol* sometimes seems to be available (to some speakers) in DE contexts. This calls for an explanation due to the observation that scalar implicatures usually disappear in DE contexts. In the grammatical view of scalar implicatures, this is potentially a testimony of an LF that lacks EXH. Under the proposal made in this paper, not having EXH under a DE operator means that *kol* is predicted to remain existential, but as noted above, it does seem to get strengthened into a universal in these environments in some cases.[8]

A possible solution would be that for these speakers, *kol* is focused in these cases. Assuming that focused elements require to be in the immediate scope of EXH, this would result in the observed U-*kol* readings in DE environments. This remains an empirical question for future research.

Moreover, certain factors interfere with how easy it is to get existential interpretations for *kol*. More specifically, NPI-*kol* seems to prefer 'abstract' restrictors, which do not denote predicates of concrete, physical entities. For example, *kol* in a sentence like NEG *arrived kol response* is more likely to be acceptable than NEG *arrived kol boy*. This is an issue we have nothing particularly intelligent to say about.

Finally, a relevant observation to make is that speakers tend to relate cases of NPI-*kol* to a higher register than that to which they relate U-*kol* and FC-*kol*. It seems that in the lower, ordinary register, there is a preference to use other, dedicated NPIs.[9]

Together with a possible competition account that could build on such preferences, a possible explanation to the register difference may draw on an important difference between NPI-*kol* on the one hand, and U-*kol* and FC-*kol* on the other hand, as it arises from our proposal. That is to say, the fact that in order to derive the latter two, exhaustification applies and results in something that differs from the prejacent, on the truth-conditional level, while in the case of NPI-*kol*, exhaustification must apply due to the requirement imposed by *kol*, as we argue, but has no truth-conditional effect; the exaustified proposition is equivalent to the prejacent. Thus, exhaustification, in the case of NPI-*kol*, is vacuous. One can claim that some condition that applies at the ordinary speech register requires exhaustification to be non-vacuous. If this is the case, then the excess in applying

[8] An argument against this objection was brought to our attention by Salvador Mascarenhas, who also provided the following two examples. The argument establishes that there is evidence for the presence of EXH in DE environments, drawn from the presence of Free Choice inferences in such environments. E.g., in the following two examples, the disjunctive sentence embedded in a DE environment shows FC inferences.

(i) a. If I am allowed to eat an apple or a pear, then I have a choice.
    b. Am I allowed to eat an apple or a pear?

This point was made by Kamp (1973) to argue against a Gricean account of FC.

[9] See discussion in Levy (2008); Tonciulescu (2011).

EXH vacuously would be taken to be related to a non-ordinary register.

## 6. Conclusion

We have presented data showing that Hebrew *kol*, which is traditionally considered a universal quantifier, is in fact an existential as is evident in questions ((8b)). Our analysis is that the universal import of *kol* is only a derivative of it being an existential that:

1. Must undergo exhaustification.
2. Introduces domain alternatives and lacks a scalar alternative.

We claimed that this is in line with different phenomena of disjunctions with conjunctive meanings for which analyses in similar terms have been suggested. Finally, we sketched a possible way for embedding our analysis in a general theory of PSIs while maintaining the notion of Innocent Excludability.

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