A post-suppositional account for comparatives in counterfactual antecedents

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Counterfactuals containing comparatives in their antecedent

Context: In the film *Children of Heaven*, in order to win a pair of sneakers for his younger sister, Ali needs to place exactly third in a race. However, he accidentally places first.

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if he had been **less fast**.

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Main goal of today's talk

Accounting for the semantics of counterfactuals containing comparatives embedded in their antecedents.

Overview

1. I show how comparatives embedded in counterfactual antecedents **seemingly** challenge (i) the minimal change theory (Stalnaker 1968, Lewis 1973) and (ii) the background theory (Ciardelli et al. 2018).

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Essentially, comparatives (e.g., *more*, *less*, *(tall)-er than 6 feet*) denote (potentially imprecise) definite descriptions of degree-related values, and these values can be verified at a later stage (like cardinalities) (see also Brasoveanu 2013).

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Essentially, comparatives (e.g., *more*, *less*, *(tall)-er than 6 feet*) denote (potentially imprecise) definite descriptions of degree-related values, and these values can be verified at a later stage (like cardinalities) (see also Brasoveanu 2013).

3. I generalize this account to a few other cases and discuss an alternative account – Lassiter (2017)'s probability-based account.

Outline

1. The two theories for interpreting counterfactuals
   - The minimal change theory
   - The background theory
2. A new analysis for the interpretation of comparatives
3. Accounting for counterfactuals with embedded comparatives in their antecedent
4. Discussion
5. Concluding remarks and outlook

The minimal change theory

(2) If this match was struck, it would light.

- We allow certain facts to carry over from the **actual world** to the **hypothetical situations under consideration**.

Stalnaker (1968), Lewis (1973)

The minimal change theory

- Counterfactuals are interpreted by means of a relation of similarity to the world of evaluation (say the actual world w_0).
- This relation is assumed to be a weak total order on possible worlds (i.e., ties are allowed).
- Intuitively, compared to a world w'', a world w' is considered more similar to the world of evaluation w_0, just in case getting from w_0 to w' involves a smaller amount of change than getting from w_0 to w''.
- A counterfactual $\phi > \psi$ is true at w_0 in case ψ is true at each of the ϕ-worlds that are most similar to w_0.

Stalnaker (1968), Lewis (1973)

Challenging the minimal change theory?

(1) Ali would have placed third and won the sneakers
if he had been **less fast**.

- **Prediction of the minimal change theory**: for those hypothetical worlds where Ali was slightly less fast than his actual speed, he placed third and won the sneakers.

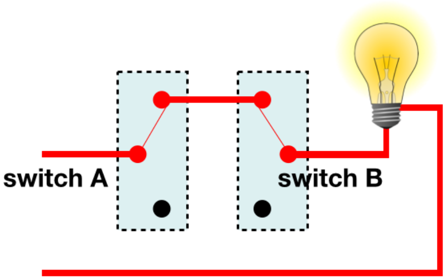
Challenging the minimal change theory?

(1) Ali would have placed third and won the sneakers
if he had been **less fast**.

- **Prediction of the minimal change theory**: for those hypothetical worlds where Ali was slightly less fast than his actual speed, he placed third and won the sneakers.
- Not necessarily. Ali might end up placing second, so he still cannot win a pair of sneakers for his sister.

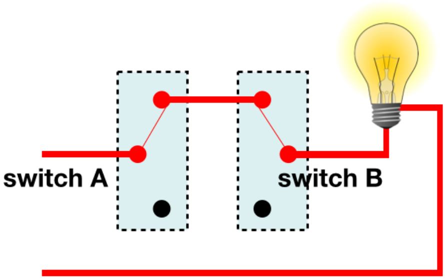
Motivating a new theory – the background theory

Imagine a long hallway with a light in the middle and with two switches, one at each end. One switch is called switch A and the other one is called switch B. As the wiring diagram in the figure shows, the light is on whenever both switches are in the same position (both up or both down); otherwise, the light is off. Right now, switch A and switch B are both up, and the light is on. But things could be different ...



Ciardelli et al. (2018)

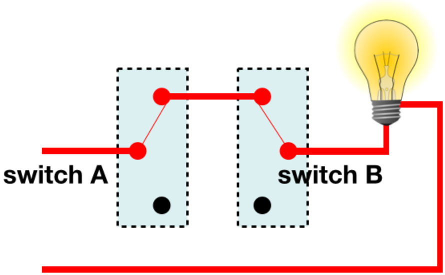
Motivating a new theory – the background theory



(3)
a. If switch A was down, the light would be off. $\overline{A} > \text{OFF}$
b. If switch B was down, the light would be off. $\overline{B} > \text{OFF}$
c. If switch A or switch B was down, the light would be off. $\overline{A} \vee \overline{B} > \text{OFF}$
d. If switch A and switch B were not both up, the light would be off. $\neg(A \wedge B) > \text{OFF}$
e. If switch A and switch B were not both up, the light would be on. $\neg(A \wedge B) > \text{ON}$

Ciardelli et al. (2018)

Motivating a new theory – the background theory



Sentences	N	True	(%)	False	(%)	Indeterminate	(%)
$\overline{A} > \text{OFF}$	256	169	66.02%	6	2.34%	81	31.64%
$\overline{B} > \text{OFF}$	235	153	65.11%	7	2.98%	75	31.91%
$\overline{A} \vee \overline{B} > \text{OFF}$	362	251	69.33%	14	3.87%	97	26.80%
$\neg(A \wedge B) > \text{OFF}$	372	82	22.04%	136	36.56%	154	41.40%
$\neg(A \wedge B) > \text{ON}$	200	43	21.50%	63	31.50%	94	47.00%

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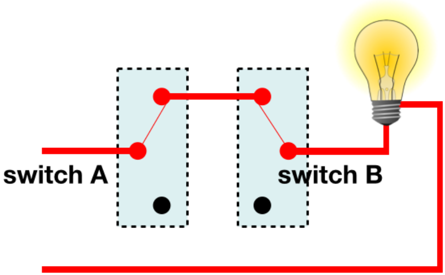

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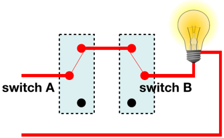
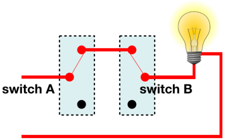


$\neg(A \wedge B) > \text{OFF}$

- **Backgrounded facts** – those not mentioned in the antecedent – remain fixed.
- **Foregrounded facts** – those that are not backgrounded facts – can be varied without any minimality constraint.

Motivating a new theory – the background theory



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- **Inquisitive semantics**: the alternatives get projected to higher levels.
- **Simplification of disjunctive antecedents (SDA)**: $\overline{A} \vee \overline{B} > \text{OFF}$ entails $\overline{A} > \text{OFF}$, and $\overline{A} \vee \overline{B} > \text{OFF}$ entails $\overline{B} > \text{OFF}$.

Challenging the background theory?

(1) Ali would have placed third and won the sneakers
if he had been **less fast**.

- **Prediction of the background theory**: for those hypothetical worlds where Ali was much less fast than his actual speed, he placed third and won the sneakers.

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- **Prediction of the background theory**: for those hypothetical worlds where Ali was much less fast than his actual speed, he placed third and won the sneakers.
- Most likely false. Ali might be too slow to win any prize.

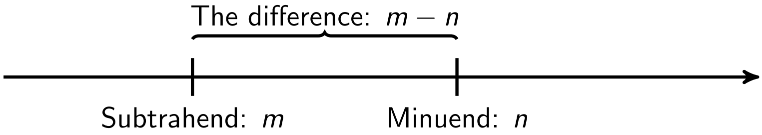
Summary of the dilemma

(1) Ali would have placed third and won the sneakers
if he had been **less fast**.

- **The minimal change theory**: We only consider those hypothetical worlds where Ali was slightly less fast than his actual speed.
- **The background theory**: We need to consider those hypothetical worlds where Ali was greatly less fast than his actual speed.

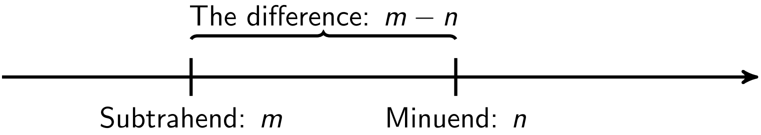
Outline

Range of values: a generalization of degree or cardinality



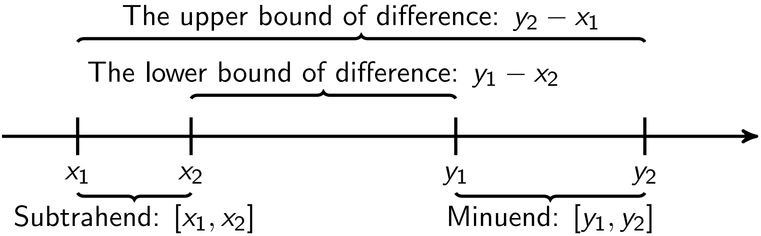
Zhang and Ling (2018), Zhang (2018)

Range of values: a generalization of degree or cardinality



A generalized view with ranges of values

$[y_1, y_2] - [x_1, x_2] = [y_1 - x_2, y_2 - x_1]$ Moore (1979)



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Range of values: a generalization of degree or cardinality

(4) a. $[\![\text{between 3 and 5}]\!] = [3, 5]$
b. $[\![\text{more than 3}]\!] = (3, +\infty)$
c. $[\![\text{(fast)-er}]\!] = (\text{actual-speed}, +\infty)$
d. $[\![\text{less (fast)}]\!] = (-\infty, \text{actual-speed})$

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What are these ranges of values?

These intervals (i.e., convex sets of degrees) are considered **not-very-precise definite descriptions** of values.

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(5) a. Mary is taller than every boy is.
height(M)
$-[\text{height(shortest boy)}, \text{height(tallest boy)}] = (0, +\infty)$
b. 27 minus 35 is -8.
The value of 27 $-$ the value of 35 $=$ the value of -8.

Range of values: a generalization of degree or cardinality

(6) How many students came?

a. 27 students came. — More precise
b. Between 20 and 30 students came. — Less precise

(7) How tall is Mary?

a. Mary is 5 feet 3 inches tall. — More precise
b. Mary is between 5 feet and 5 feet 5 inches. — Less precise

(8) What did Mary eat?

a. Mary ate an orange. — More precise
b. Mary ate a piece of fruit. — Less precise

Range of values: a generalization of degree or cardinality

(9) Between 20 and 30 boys came.
$\neq$ 20 boys came $\vee$ 21 boys came $\vee \ldots \vee$ 30 boys came
$\neq$ exactly 20 boys came $\vee \ldots \vee$ exactly 30 boys came

Range of values: a generalization of degree or cardinality

(9) Between 20 and 30 boys came.
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- This sentence means that for the **maximal** plural event that is a sum of boy_{atom}-coming events, the cardinality of this total number of atomic boys is between 20 and 30 (see Brasoveanu 2013).

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(10) Maximality effects (Szabolcsi 1997, de Swart 1999, Krifka 1999, Umbach 2005)
  a. Exactly 10 boys came. # Some other boys came, too.
  b. Between 5 and 10 boys came. # Some other boys came, too.
  c. More than 30 boys came. # Some other boys came, too.

Range of values: a generalization of degree or cardinality

- The notion of **maximality** should be cashed out in terms of **informativity**, rather than in terms of the **size** of the plural individual / events (von Fintel et al. 2005/2012, Schlenker 2012).

Range of values: a generalization of degree or cardinality

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(11) a. Mary is taller than every boy is.
The difference: $(0, +\infty)$
The height of Mary: $(\text{tallest boy}, +\infty)$

b. Mary is between 2 and 5 inches taller than every boy is.
The difference: $[2'', 5'']$
The height of Mary: $(\text{tallest boy} + 2'', \text{shortest boy} + 5'')$

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Upshot

Comparatives denote a relation among three definite description of degree-relation values, which all convey maximal informativity.

Outline

A post-suppositional evaluation for definite degrees or cardinalities

(12) Brasoveanu (2013)

a. ⟦exactly 3 dogs ran⟧ = for the **totality** of dogs that ran, the cardinality is equal to 3.

b. ⟦between 3 and 5 dogs ran⟧ = for the **totality** of dogs that ran, the cardinality is between 3 and 5.

A post-suppositional evaluation for definite degrees or cardinalities

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(1) Ali would have placed third and won the sneakers
if he had been **less fast**.
⟦(1)⟧ = Ali would have placed third and won the sneakers
if his speed had fall into a **definite interval** I,
and $I -$ his actual speed $\subseteq (-\infty, 0)$.

Outline

Generalization

(13) If I hadn't bet on Slowpoke, I'd have won. negation
[a certain definite fact $\delta >$ I have won] $\wedge$
[$\delta \subseteq$ I hadn't bet on Slowpoke]

(14) If I had bet on a different horse, I'd have won. indefinite
[a certain definite fact $\delta >$ I have won] $\wedge$
[$\delta \subseteq$ I had bet on a different horse]

Generalization

(15) If I had eaten a piece of fruit, I'd have eaten an orange.
[a certain definite fact $\delta >$ I have eaten an orange] $\wedge$
[$\delta \subseteq$ I had eaten a piece of fruit]

(16) If it were raining or snowing in Santa Fe, it would be raining.
[a certain definite fact $\delta >$ it would be raining in Sante Fe] $\wedge$
[$\delta \subseteq$ it was somehow a non-sunny weather in Santa Fe]

Lassiter (2017)'s probability-based account

'When there are multiple ways of instantiating a counterfactual antecedent, we prefer scenarios that are more likely given general probabilistic causal knowledge. '

Lassiter (2017)'s probability-based account

'When there are multiple ways of instantiating a counterfactual antecedent, we prefer scenarios that are more likely given general probabilistic causal knowledge. '

(18) If it were raining or snowing in Santa Fe, it would (probably) be raining.

- Suppose that possible states of weather in S.F. are {sun, cloud, rain, snow}, with respective probabilities [0.9, 0.079, 0.02, and 0.001].
- Interventions that make **rain** $\vee$ **snow** true are weighted according to prior probabilities: (18) is thus true with probability $.02/(.02 + .001) \approx .95$.

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Something doubtful

- $A >$ **probably** B does not mean '$[A > B] \wedge$ probably A happens'.
- Do we generally make use of probabilistic knowledge in interpreting imprecision? $[\![$I ate a piece of fruit$]\!] \neq [\![$probably I ate an apple$]\!]$.

Outline

Concluding remarks and outlook

- Here I propose to analyze comparatives as potentially not-very-precise definite descriptions of values, thus accounting for the interpretation of counterfactuals containing comparatives in their antecedent.
  In these sentences, the potentially imprecise value is verified as post-suppositional requirement.

Concluding remarks and outlook

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- Therefore, sentences like (1) present no challenge to either the minimal change theory or the background theory.

Concluding remarks and outlook

- Here I propose to analyze comparatives as potentially not-very-precise definite descriptions of values, thus accounting for the interpretation of counterfactuals containing comparatives in their antecedent. In these sentences, the potentially imprecise value is verified as post-suppositional requirement.
- Therefore, sentences like (1) present no challenge to either the minimal change theory or the background theory.
- Imprecise degrees (i.e., intervals) or cardinalities may sound fine. But to what extent can this imprecision be extended for the cases of negation, indefinites, and disjunctions?

Thank you!

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