Choice Functions: From Definite Descriptions to Conditionals

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We suggest that the Choice Function analysis of definite descriptions can and should be extended to if-clauses, and that the proposed analysis gives a formal account of striking observed in Lewis 1973 between Definite Descriptions and If-clauses.

1. Lewis 1973 observed that patterns of non-monotonicity with conditionals can be replicated with definite descriptions ('Lewis's Generalization'). Standard patterns of monotonic reasoning fail in both cases, which is surprising if if-clauses are analyzed as restricted universal quantifiers over worlds, and if definite descriptions are analyzed either in Russellian or in Strawsonian terms. (In the following examples '**ιx**' is interpreted as: 'the' or as 'if', depending on the case; p and q are predicates of individuals or predicates of worlds):

(1) Failure of Strengthening of the Antecedent: **[ιx:p] [q]** does not entail **[ιx:p&p'] [q]**
a. If this match were struck, it would light, but if this match had been soaked in water overnight and it were struck, it wouldn't light [modified from Stalnaker 1968)
b. The pig is grunting, but the pig with floppy ears is not grunting [Lewis 1973]
c. The students are rather satisfied, but some ~~students~~ in Beijing are not
d. #Every student is rather satisfied, but some ~~student~~ in Beijing isn't [clearer contrast if ~~student~~ is elided]

(2) Failure of Transitivity; [**[ιx: p] [q]** and **[ιx: q] [r]**] does not entail: **[ιx: p] [r]**
a. If B. wins the election, S. will retire to private life. If S. dies tomorrow, B. will win the election ≠> If S. dies tomorrow, S. will retire to private life.
b. The students are vocal. The undergraduates in Beijing are students.
≠> The undergraduates in Beijing are vocal.

2. In the case of definite descriptions, Lewis's idea was that 'the pig' refers to the *most salient* pig in the domain of discourse. Since the most salient pig is not necessarily the most salient pig *with floppy ears*, the lack of monotonicity followed. Von Heusinger and Egli have formalized this intuition in terms of Choice Functions; in a contex c, $f([[pig]]^c)$ selects the most salient pig in c. With respect to if-clauses, Stalnaker had originally modelled their non-monotonic behavior in terms of a notational variant of Choice functions, his 'selection functions', with 'salience' replaced by 'similarity between worlds'. In effect, 'if p' was analyzed as: 'the closest world satisfying p'. But Lewis himself did *not* follow this path, and used a sphere-based system instead (see the definition of his truth-conditions in the following table). We suggest that this was incorrect, and that a Choice function analysis is superior, and can be extended to address some of Lewis's criticisms if if-clauses are analyzed as *plural* definite descriptions of possible worlds. Thus we argue that 'if p' should be analyzed as: 'the closest/most salient world**s** satisfying p'. The resulting system is intermediate between Stalnaker's and Lewis's (it is equivalent to Lewis's system together *with* the 'Limit Assumption', but without what Lewis calls 'Stalnaker's Assumption')

3. This system has several advantages.

(a) Against Lewis: Lewis worried that Stalnaker's system, or an extension of it, would fail to account for the following sentence:

(3) If this line were longer than it is, it would be less than 2"

If worlds are ordered by similarity and if the similarity measure is the difference between the length of the line in the world in question and its length in the actual world, there must be an infinite sequence of worlds each of which is more similar to the actual world than the previous member of the sequence (this is because measures of lengths are dense). Thus in this case there is no 'most similar' world or worlds, which appears to invalidate both Stalnaker's system and our proposed extension. However: (i) it is highly unclear that measures of similarity are ever as fine-grained as Lewis assumes in this example. Furthermore, (ii) Lewis's own sphere-based system makes incorrect predictions in this case (a point already noted in McCawley 1993). This is because he predicts that if the line is actually 1", each of the following statements should necessarily be true, contrary to fact: 'If this line were longer than it is, it would be less than 2"', 'If this line were longer than it is, it would be less than 11/4"', 'If this line were longer than it is, it would be less than 11/8", etc. It is better in this case to assume that the similarity measure is not so fine-grained, which allows us to preserve the Choice function analysis.

(b) Against Stalnaker: [b1] Stalnaker had to assume that a single 'closest world' can always be selected, an implausible assumption with debatable consequences ('if p, q or if not-p, q', the 'conditional excluded middle', is a tautology in his system, since the value of 'if p' is a single world). By assuming that 'if p' is analyzed in terms of a choice function which selects a *plurality* of worlds ('the closest world**s'**), we can relax the implausible assumption and avoid its consequence ('if p, q or if not-p, q' isn't a tautology; it could be that some the worlds in $[[\text{if } p]]^c = f(p, c)$ ($[[p]]^c$) satisfy q, while others satify not-q). [b2] Our system has the additional advantage of extending straightforwardly to generalized quantification, such as: 'Necessarily/possibly/most probably if p, q'. This wasn't the case on Stalnaker's analysis, since there the value of 'if p' was a single world. As soon as pluralities of worlds are considered, the problem can be solved in the same way as it is for definite descriptions ('All/some/most of the students are happy).

Stalnaker's System	**Choice Functions selecting a plurality of worlds**	**Lewis's System**
Selection Function, **one** world **[[if φ]] = f(i, φ) W** **= j** *the closest p-world is a q-world*	Selection Function, **several** worlds **[[if φ]] = f(i, φ) W** **= {j_1, j_2, j_3, …}** *the closest p-world**s*** ***are*** *q-world**s***	**No** Selection Function. Spheres
"If φ, ψ" is true at world i iff either (1) No φ-world exists, or (2) f(i, φ) [[ψ]]	"If φ, ψ" is true at world i iff either (1) No φ-world exists, or (2) f(i, φ) [[ψ]]	"If φ, ψ" is true at word i (according to the system of spheres \$), iff either (1) No φ-world belongs to any sphere S in $\$_i$, or (2) Some sphere S in $\$_i$ does contain at least one φ-world, and φ ψ holds at every world in S
Conditional excluded middle j [[ψ]] j [[¬ψ]]	**No conditional excluded middle** It may be that neither {j_1, j_2, j_3, …} [[ψ]] nor {j_1, j_2, j_3, …} [[¬ψ]]	**No conditional excluded middle**
Limit Assumption satisfied => cannot handle infinite sequence of worlds each closer than the prev	**Limit Assumption satisfied** => cannot handle infinite sequence of worlds each closer than the previous one	**Limit Assumption not satisfied** => **can** handle infinite sequence of worlds each closer than the prev
<u>No</u> extension to Gen. Quant. (a single world cannot restrict a GQ)	**Easy extension to Gen. Quant.** (a plural description **can** restrict a GQ)	**?**