Might and Free Choice in Inquisitive Semantics

Disjunction in the scope of *might* notoriously triggers a conjunctive inference:

(1) John might be in Paris or in London.
$\Rightarrow$ John might be in Paris and he might be in London.

This is a so-called *free choice* effect, a phenomenon that is widely discussed in the recent literature. One of the main open problems in this area, originally observed by Zimmermann (2000), is that free choice effects also arise if disjunction takes overt wide scope:

(2) John might be in Paris or he might be in London.
$\Rightarrow$ John might be in Paris and he might be in London.

We present an analysis of *might* that captures this inference straightforwardly. The idea is that the conversational purpose of *might* in examples like (1) and (2) is to *highlight* certain possibilities. Inquisitive Semantics (Groenendijk 2008, Mascarenhas 2008) allows us to formalize this idea in a natural way.

Language. We assume a propositional language extended with a sentential operator $\Diamond$, which is intended to model the behaviour of *might*.

Semantics. A *state* is a set of valuations. A *stage* is a set of states. We use s, t as meta-variables ranging over states, and g, h as meta-variables ranging over stages. A *highlighted stage* (*staghe* for short) is a pair $\langle g, h\rangle$ where g is a stage and $h \subseteq g$ a set of states in g which should be thought of as "highlighted". We will refer to $\langle \emptyset, \emptyset\rangle$ as the *inconsistent* staghe. If $\langle g, h\rangle$ and $\langle g', h'\rangle$ are two staghes, then $\langle g, h\rangle \cup \langle g', h'\rangle = \langle g \cup g', h \cup h'\rangle$. $\langle g, h\rangle[\varphi]$ denotes the staghe that is obtained by updating $\langle g, h\rangle$ with φ, and $\langle g, h\rangle\|\varphi\|$ denotes the staghe that is obtained by highlighting the states in g that support φ, presupposing that there are such states (otherwise we are lead to the inconsistent staghe). $c[\varphi]$ and $c\|\varphi\|$ are recursively defined as follows:

Updating.

1. $\langle g, h\rangle[p] = \langle g[p], h[p]\rangle$
   where $g[p] = \{s \in g \mid \forall v \in s : v(p) = 1\}$
2. $\langle g, h\rangle[\neg\varphi] = \langle g', h \cap g'\rangle$
   where $g' = \{s \in g \mid \langle\{s\}, \emptyset\rangle[\varphi] = \langle\emptyset, \emptyset\rangle\}$
3. $\langle g, h\rangle[\varphi \wedge \psi] = \langle g, h\rangle[\varphi][\psi]$
4. $\langle g, h\rangle[\varphi \vee \psi] = \langle g, h\rangle[\varphi] \cup \langle g, h\rangle[\psi]$
5. $\langle g, h\rangle[\Diamond\varphi] = \langle g, h\rangle\|\varphi\|$

Highlighting.

1. $\langle g, h\rangle\|p\| = \begin{cases} \langle g, h \cup g[p]\rangle & \text{if } g[p] \neq \emptyset \\ \langle\emptyset, \emptyset\rangle & \text{otherwise} \end{cases}$
2. $\langle g, h\rangle\|\neg\varphi\| = \begin{cases} \langle g, h \cup g'\rangle & \text{if } \quad g' \neq \emptyset \\ \langle\emptyset, \emptyset\rangle & \text{otherwise} \end{cases}$
   where $g' = \{s \in g \mid \langle\{s\}, \emptyset\rangle[\varphi] = \{\emptyset, \emptyset\}\}$

3. $\langle g,h\rangle \|\varphi \wedge \psi\| = \langle g,h\rangle \|\varphi\| \|\psi\|$
4. $\langle g,h\rangle \|\varphi \vee \psi\| = \langle g,h\rangle \|\varphi\| \cup \langle g,h\rangle \|\psi\|$
5. $\langle g,h\rangle \|\Diamond\varphi\| = \langle g,h\rangle \|\varphi\|$

Illustration. Let's start with $\Diamond p$. $\langle g,h\rangle[\Diamond p] = \langle g,h\rangle \|p\|$. That is, to update with $\Diamond p$ is to highlight p. If there are no states in g that support p, then it is impossible to highlight p, and we are lead to the inconsistent staghe. Otherwise, $\langle g,h\rangle \|p\| = \langle g, h \cup |p|\rangle$, where $|p|$ is used to denote the set of states in g that support p. The free choice data are handled straightforwardly. If g is a stage in which some states support p and some support q, then we get:

$\langle g,\emptyset\rangle[\Diamond(p \vee q)]$	$\langle g,\emptyset\rangle[\Diamond p \vee \Diamond q]$	$\langle g,\emptyset\rangle[\Diamond p \wedge \Diamond q]$
$= \langle g,\emptyset\rangle \|p \vee q\|$	$= \langle g,\emptyset\rangle[\Diamond p] \cup \langle g,\emptyset\rangle[\Diamond q]$	$= \langle g,\emptyset\rangle[\Diamond p][\Diamond q]$
$= \langle g,\emptyset\rangle \|p\| \cup \langle g,\emptyset\rangle \|q\|$	$= \langle g,\emptyset\rangle \|p\| \cup \langle g,\emptyset\rangle \|q\|$	$= \langle g,\|p\|\rangle[\Diamond q]$
$= \langle g,\|p\|\rangle \cup \langle g,\|q\|\rangle$	$= \langle g,\|p\|\rangle \cup \langle g,\|q\|\rangle$	$= \langle g,\|p\| \cup \|q\|\rangle$
$= \langle g,\|p\| \cup \|q\|\rangle$	$= \langle g,\|p\| \cup \|q\|\rangle$	

Note that the result is exactly the same in all three cases. If g is a stage in which there is no state that supports p or no state that supports q, then the update with $\Diamond p \wedge \Diamond q$ yields a presupposition failure and lead us to the inconsistent stage. If g neither contains states that support p nor states that support q, then the other two updates will also lead to the inconsistent stage, as desired.

Conclusion. One of the prominent conversational purposes of *might* is to highlight possibilities. This idea can be implemented in Inquisitive Semantics in a natural and straightforward way. This leads to a long-sought solution for one of the major open problems in the theory of free choice.

References.

J. Groenendijk (2008). *Inquisitive Semantics: Conditionals, Questions, and Disjunction*, Semantics and Linguistic Theory (SALT 18).

S. Mascarenhas (2008). *Inquisitive Semantics*, unpublished manuscript, Institute for Logic, Language, and Computation, University of Amsterdam.

T.E. Zimmermann (2000). *Free Choice and Epistemic Possibilities*, Natural Language Semantics, 8(4), 255–290.