



Framing-Effects : What logic for what intensional phenomenon ?

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Empirically observed cognitive biases raise a challenge for the more formal approach to rationality. Logicians when facing these cases can be led to reflect on some basic problems of theirs. I will present some intuitions that justify the characterization of Kahneman and Tversky's framing-effects in terms of an intensional phenomenon (Arrow 1982, Schick 1992, Kahneman 2003). I will then reflect on the axiomatic weakenings that would be required in decision theory to logically capture this phenomenon.

In typical framing-effects such as the one occurring with the Asian Disease Problem (ADP) extensionally equivalent options are not processed as such through choices or preferences. Framing-effects imply, more strongly, that even though the extensional equivalence of two propositions $P1$ and $P2$ is subjectively realized, they are not substitutable in choice or preference contexts. [F-E : it is not the case that « $P1$ logically equivalent to $P2$ » cognitively entails that « $P1$ is indifferent to $P2$ »]. This has been labelled a violation of the invariance principle of decision theory, hinting at a normatively deep connection between extensionality in logic and indifference in choice and consequently conferring on classical logic an implicit normative scope in decision theory.

Framing-effects, as an instance of the general phenomenon of intensionality in language and thought, present specific features. Intensionality typically points to the lack of perception of informational equivalence. Note that we have envisioned the possibility that perception of informational equivalence does not lead to the implementation of extensionality in some contexts as a defining feature of framing-effects. How is this possible ? Several elements cognitively combine to yield this phenomenon. Focalization seems to provide a central pragmatic explanation. When facing the extensional equivalence between $P1$: « 400 survivors out of 600 contaminated people » and $P2$: « 200 survivors out of 600 contaminated people » (speaking of the same group of 600 people), some psychological and pragmatical reasons may lead the subjects to focus on one piece of information (e.g. 200 survivors), in their choices or expressions of preferences, to the detriment of the other (e.g. irrespective of the complementary numbers of dead). Intensionality of framing-effects can then be semantically translated in terms of what is considered as atomic non-

correlated pieces of information in choices and preferences while otherwise considered logically co-extensional. I'll give a pre-formal characterization of this idea.

Intensionality of framing-effects must follow from a proper weakening of axioms of Decision Theory. Taking my inspiration from a formally unsuccessful, but intuitively aligned with my own characterization of the phenomenon at stake, attempt by Schick (*Ambiguity and Logic.*), I will derive intensionality in Decision Theory by preventing through the introduction of an intuitive axiom unwanted extensional substitutions in attribution-of-utility contexts. [A formal presentation of this derivation is upcoming**].