Theories, queries, “frames” and language games: Commentary on Wall, Crookes, Johnson Weber (2020) (and the literature on risky-choice framing)

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Abstract

In a recent article, Wall, Crookes, Johnson and Weber (2020) claim that Query Theory has better explanatory success in accounting for recent data than the Explicated Valence Account of Tombu and Mandel (2015). In this commentary, I first argue that this claim is not supported by the full range of available evidence. I then draw attention to the pernicious problem in framing studies in which researchers do not adequately ensure that framing manipulations are what they claim to be—namely, extensionally equivalent re-descriptions of the same events or event classes. The difficulty of establishing extensional equivalence in the context of experimental language games (such as the Asian Disease Problem) is under-appreciated. Unfortunately, inter-subjective agreement that the extensional equivalence assumption is met, even amongst a majority of respectable decision theorists, does not constitute sufficient evidence that it is met. Empirical evidence challenges the equivalence assumption, raising meta-theoretical questions about the integrity of some framing research.

Keywords: framing effect, risky choice, query theory, explicated valence account, extensional equivalence, coherence

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Finally, I would have preferred that my commentary, ideally with a reply to it from Wall et al. (2020), be published in *Judgment and Decision Making*. But, it was rejected for what seems to me to be poor reasons. If you are interested in my exchange with the editor, my detailed critique can be found at <https://wordpress.com/post/mandelian.wordpress.com/47>.

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1 Introduction

The aims of this commentary are twofold: first, to address the theoretical claims of Wall Crookes, Johnson and Weber (2020; hereafter WCJW2020) made in a recent issue of this journal and, secondly, to comment briefly on the methodological and conceptual well-being of framing research, in general, by examining whether framing research has ensured that the vital extensional equivalence assumption has been met.

1.1 Does QT have better predictive power than EVA?

WCJW2020 advance Query Theory (QT) to explain risky-choice framing effects (Levin et al., 1998). They posit that alternative frames have differential effects on choice through the mediating pathway of arguments recruited in favor of the alternative prospects under consideration. Further, according to QT, the arguments are retrieved from memory. This, according to WCJW2020, distinguishes QT from, for instance, fuzzy trace theory (Reyna & Brainerd, 1991), which the authors attribute to representational processes that are presumably constructed on the fly. WCJW2020 do not test QT's retrieval postulate, at least not in the framing context. It is simply assumed to be plausible.

In principle, however, I fail to see how retrieval can be defended as a central process underlying responses to risky-choice framing problems, which, like many other tasks in judgment and decision-making research, are online tasks with which subjects have no prior experience. Nor is the typical subject likely to retrieve a relevant reference class for such problems. Indeed, that would be virtually impossible in problems such as the Asian Disease Problem (ADP). Instead, it is much more plausible that subjects construct preferences on the fly, given that tasks such as the ADP are online and rather than memory-based (Hastie & Park, 1986). The distinction between contexts of retrieval versus construction is also central in norm theory (Kahneman & Miller, 1986), which posits that psychological responses to scenarios, experienced or described, are often "post-computed" on the fly. Likewise, Kahneman and Tversky (1982) introduced the simulation heuristic to account for what they regarded as a vast number of situations in which people engage heuristics that construct rather than retrieve relevant input for judgments and decisions. Therefore, to propose that framing effects, which are based on online tasks, are principally due to retrieval processes seems to set off on a weak theoretical footing. Of course, online construction draws on memory processes: "online vs. memory-based" should be viewed as a distinction, not as a rigid dichotomy. In the context of framing effects, however, it does not offer a particularly powerful explanatory approach, much as it would not add much to our understanding of framing effects to note that sense perception is necessary for their occurrence, even though this is true.

In the General Discussion, WCJW2020 further claim that the QT account of framing effects has greater explanatory power than the Explicated Valence Account (EVA; Tombu & Mandel, 2015) of framing effects because only QT predicts the results of findings reported

by DeKay et al. (2019). Briefly, EVA posits that framing effects are largely predictable on the basis of the valence of statements that are explicated in descriptions of choice options. For instance, EVA can account for the typical pattern of choices in the ADP in which people select the sure option if the options are framed positively and they select the risky option if the options are framed negatively. In EVA, this is due to the fact that the sure option is partially explicated and either refers to a positive explicated outcome (in the positive frame) or a negative explicated outcome (in the negative frame), whereas the risky options in both frames are mixed in the sense that both positive (i.e., all saved/no one dies) and negative (i.e., no one saved/all die) are explicated. EVA can also account for cancellation of framing effects either by subtracting the frame-inconsistent statement from risky outcome (Mandel, 2001) or by making the sure options mixed as well (Kühberger, 1995; Mandel, 2014). EVA could also account for reversals of the standard framing effect such as if the sure options are mixed and the risky options are truncated, thus reversing the asymmetry in explication found in the ADP (Tombu & Mandel, 2015). QT, in contrast, cannot easily account for this wide range of effects. The empirical evidence that WCJW2020 muster in favor of the claim that QT provides a better account of risky-choice framing effects than EVA is not to be found in their own experiments but is instead tucked away in an appendix referring to two experiments by DeKay et al. (2019) in which responses to two framing tasks were compared. One task used a standard ADP variant in which the sure options were expressed with complete certainty (200 lives saved in the gain frame or 400 lives lost in the loss frame). The other task used a novel “slightly risky” variant in which the sure options were replaced by risky options expressed with uniformly positively-framed or uniformly negatively-framed options. The options in the novel “slightly risky” task are as follows:

Positive Frame:

If Program A is adopted, there is a 1/3 probability that 400 people will be saved and a 2/3 probability that 100 people will be saved.

If Program B is adopted, there is a 1/3 probability that 600 people will be saved and a 2/3 probability that no people will be saved.

Negative Frame

If Program C is adopted, there is a 1/3 probability that 200 people will die and a 2/3 probability that 500 people will die.

If Program D is adopted, there is a 1/3 probability that no people will die and a 2/3 probability that 600 will die.

In all cases (i.e., the standard and slightly-risky conditions), the alternative options were described using the standard risky options presented in the ADP. De Kay et al. (2019) found that in both experiments the framing effect was significantly larger in the slightly-risky condition than in the standard condition. WCJW2020 claim that QT can account for these findings, but EVA cannot. According to WCJW2020, QT predicts this because the

option sentiment is either doubly positive (in the positive frame) or doubly negative (in the negative frame), whereas the standard certain options are only singly positive or negative. First, it must be stated that this is an entirely ex-post explanation of DeKay et al.'s (2019) findings. WCJW2020 do not introduce theoretical postulates earlier in their description of QT that make this prediction. Nor do the authors explain how this prediction is predicated on the memory-based process account that QT represents.

Second, WCJW2020 misrepresented EVA by claiming the following:

The Explicated Valence Account posits that the valence of choice options drives framing effects: whichever choice option has a higher valence is preferred (Tombu & Mandel, 2015). However, the Explicated Valence Account does not quantify valence. Therefore, the Explicated Valence of the slightly risky option is the same as the Explicated Valence as the traditional certain option, meaning it also predicts similarly sized framing effects. (pp. 702-703)

However, Tombu and Mandel (2015) were explicit in stating that EVA leaves open the process-level explanation for future research. Yet, among the three candidate processes they discussed was a heuristic strategy in which the numbers of positive and negative explicated outcome descriptions are counted to determine overall option favorability. Accordingly, Tombu and Mandel (2015) stated:

[O]ne could examine whether risk and preference might be affected by unpacking these singular descriptions of positive and negative valence into subsets. For instance, the preference for segregating gains and integrating losses (Thaler, 1985) suggests that it may be more appealing to have a greater number of positive explicated outcomes and fewer negative explicated outcomes, even if the variations in number make no difference to the overall sums. (p. 474)

It is therefore incorrect to characterize EVA as predicting no difference between the size of framing effects in the standard and slightly-risky account. In fact, EVA is more tightly coupled to this prediction because there is an unambiguous rule linking the explication of valence to the number of valence-laden statements used to characterize a decision option. In contrast, the conceptual link to QT's memory process-based account is opaque.

Third, WCJW2020 claim greater empirical support for QT than for EVA on the basis of selective evidence. EVA was introduced in Tombu and Mandel (2015) and has not been expanded upon elsewhere since then. Therefore, the authors should be familiar with the two experiments Tombu and Mandel (2015) reported. These experiments include conditions pertinent to precisely the type of contrasts in which WCJW2020 claim that QT has better explanatory power than EVA. In fact, the percentages of subjects' choices for the sure or risky options in the various conditions and across the two experiments were summarized in a single table. Tombu and Mandel (2015) presented financial variants of the ADP. In one variant of Experiment 1, participants must choose between retaining \$800 (out of \$2400 at

risk of loss) or accepting a gamble that offers a 1/3 probability of retaining \$1200 and a 2/3 probability of retaining \$600. According to WCJW2020, in this case, a majority should favor the gamble because it involves two statements about positive outcomes, whereas the certain option has only one statement about a positive outcome. However, a slight majority (53%) favored the sure option with only one positive outcome. Or consider that in Experiment 2, participants in one variant of the task in which \$600 is at stake are assigned to the following conditions:

Positive Frame:

[Option A] She will get back \$200 but she will not get the other \$400 back.

[Option B] There is a 1/3 probability that she will get \$600 back and a 2/3 probability that she will get \$0 back.

Negative Frame:

[Option A] She will lose \$400 but she will not lose the other \$200.

[Option B] There is a 1/3 probability that she will lose \$0 and a 2/3 probability that she will lose \$600.

Based on the explanation presented by WCJW2020, participants should be indifferent between the two options in both framing conditions because the paired options are matched in terms of the number of positive and negative statements. However, contrary to this prediction, majorities chose the sure option in both the positive framing (81%) and negative framing (74%) conditions.

In sum, the available evidence for simple counting-rule explanations of preferences in risky choice framing tasks, whether embedded in QT, EVA or other accounts (e.g., Reyna & Brainerd, 1991), is mixed. This would only be surprising if one were to assume that the only factor determining choice was a simple decision rule. Such a view would, for instance, neglect personal tolerances for risk and loss in different domains. For example, the finding of Tombu and Mandel (2015) reported earlier that majorities choose the sure option when both the sure and risky options are described as a mix of explicated gains and losses indicates that most subjects are not willing to gamble on losing everything just to have a 1/3 chance of losing nothing. They prefer to accept sure partial losses (even steep ones where 2/3 of the valued good will surely be lost) rather than to accept probable total losses. This is consistent with past research (Wang, 1996) showing that choosing the sure option is more common in risky-choice tasks that involve financial rather than human life consequences, as it is more generally in line with accounts emphasizing the importance of aspiration levels that are set within particular domains of decision-making (Schneider, 1992).

1.2 Is extensional equivalence adequately demonstrated?

The choice pattern described as a framing effect in the ADP—namely, choosing the sure option if given the options in the positive frame and choosing the risky option if given the options in the negative frame—has been taken as evidence of irrationality in decision making because it is claimed that this pattern of choice violates the principle of description invariance, widely regarded as one of the most unshakeable normative principles of rational choice theories (Arrow, 1982; Kahneman & Tversky, 1986). Description invariance requires that alternative descriptions refer to events or event classes with the same extensional equivalence. In the context of the ADP and similar tasks, the assumption is that “200 lives saved (out of 600)” is extensionally equivalent to “400 lives lost (out of 600)” for the “obvious” reason that $600 - 400 = 200$. In other words, one might say it is provable by arithmetic. For instance, Ken Hammond (by no means a devout adherent to the coherence school of decision theory) in referring to the ADP, advised readers who might be skeptical about the extensional equivalence of reframed options to “take another look at the options and do the arithmetic” (2000, p. 61). It is a remarkable commentary on psychologists’ thinking that this assumption has barely been seriously questioned in the 40 years since Tversky and Kahneman (1981) reported their findings on the ADP. However, beyond exhorting skeptics to “just do the math, stupid!”, how can the claim of extensional equivalence be defended? Kahneman (2000) explained the criterion that he and Amos Tversky eventually settled on:

The isolation effect was our first application of a method in which alternative versions of “the same” decision problem evoked different preferences. We constructed a pair of problems that were identical in the context of a particular interpretation of utility theory and suggested that the observation of different preferences was a counterexample to that theory. However, we eventually adopted a less theory-bound view of what makes two problems the same. It is the decision maker who should determine, after due consideration of both problems, whether the differences between them are sufficiently consequential to justify different choices. Violations of this lenient form of invariance demonstrate incoherence without a need for any judgment from on high about what is truly equivalent. (p. xv)

These are remarkable statements for several reasons. First, observe that when the judgment from on high is given (as in their first application on the isolation effect), the equivalence is admittedly contingent on “the context of a particular interpretation of utility theory” with the aim of demonstrating a counterexample to that theory. Thus, the view from on high, when given, is not a universal view; it is a highly contextualized view given for a narrow theoretical purpose. Clearly, this refreshingly honest statement is not quite the same as the typical claim that amounts to “just doing the math.”

A second remarkable aspect is that this contextualized view, when Tversky and Kahneman abandoned it, was replaced by a particular form of subjectivism in which two frames

are said to be equal if in a joint-evaluation mode, a decision maker regards the alternative options as differing in ways that are insufficiently consequential to justify different choices. This is remarkable not because it embraces subjectivism, but because it permits interpretations that would clearly violate extensional equivalence from the subject's stance and yet which would pass the equivalence test. For instance, by this definition, a gamble offering a 50% chance to win \$100 and a 50% chance to win nothing might be "the same" as a gamble offering a 50% chance to win \$200 and a 50% chance to win nothing since the differences would not be expected to prompt different choices. In both cases, we expect all cash-seeking individuals to take rather than forego the gamble presented. Yet, would not most (theorists and subjects) agree that these descriptions describe distinctly different gambles that are clearly not the same?

Finally, Kahneman's statement is remarkable because the "lenient" coherence test administered requires individuals' choices in response to descriptions presented in a separate evaluation mode to cohere with choices they might make if presented with "the same options" presented in a joint-evaluation mode. This criterion is remarkable not only because Tversky and Kahneman (1981) did not use it in their research on the ADP (the most famous of their framing tasks) and neither have other researchers in the intervening decades, but because such a test presumes that descriptions should have context-independent intra-subjective constancy. Stated differently, the criterion belies an atomistic conception of linguistic meaning. Thus, if one is to respect the invariance principle, the statement, "If Program A is adopted, 200 lives will be saved," should mean the same thing if presented alone with option B as when it is presented alongside the statement "If Program C is adopted, 400 lives will be lost," and its paired option D. Is intra-subjective constancy a normative requirement in this contrast?

From Frege (1948) and Wittgenstein (1953) onward, most philosophers and linguists have come to accept some form of the notion that language is game-like and that the meaning of words or statements take shape within the context of ongoing language games. The shift from separate- to joint-evaluation modes changes the language game and with it the meaning of statements. For instance, in the joint-evaluation mode, the complementary values "200 lives saved [out of 600]" and "400 lives lost [out of 600]" help to resolve linguistic ambiguity by strengthening the inference that the numeric quantifiers refer to exact values. In contrast, in the separate-evaluation mode, it is not even probable, let alone certain, that these "same quantifiers" will be interpreted as exact values. Mandel (2014, Experiment 3) found that when subjects presented with a gain or loss frame in an ADP-like problem were asked what the quantifiers meant to them, 64% indicated that the quantifiers (i.e., 200 or 400) meant "at least" that quantity (see also Teigen & Nikolaisen, 2009). Only 30% said that they thought the quantifiers meant "exactly" that amount (the remaining 6% thought they meant "at most" that amount). However, in the same experiment, when ambiguity was resolved by explicating the fate of the complementary number of potential victims (e.g., "If Plan A is adopted, it is certain that 200 people will be saved and 400 people will not be saved"), the

majority (61%) interpreted the quantifiers as exact values and “only” 24% interpreted them as “at least” that amount. In another experiment Mandel (2014, reported in the General Discussion), subjects given the ADP were told that there were only 200 vaccines available to save lives. When presented with a gain frame, most subjects interpreted the quantifier to mean “at most” 200 will be saved, whereas most subjects in the loss condition interpreted the quantifier to mean “at least” 400 will die. Taken together, these findings show that the meaning of the same description changes as a function of the semantic and pragmatic context within which the description is communicated. Such changes in meaning of the same string of words are not irrational violations of an unassailable invariance principle. Rather, it is the atomistic presumption that a description’s meaning (or reference, even more specifically) must be preserved or “quantized” across language games, which vary in other respects, that lacks a firm basis in rational thought.

All of this poses serious meta-theoretical problems for work on this topic. If the sure options (options A and C) in the ADP are interpreted as lower bounds (or for that matter, anything other than exact quantities), then the two descriptions cannot be said to mean the same thing. If they do not have the same meaning—or even the same referents—then they are not alternative frames. In a separate-evaluation mode, it is therefore unlikely that the task meets the conditions for a test of framing, if framing in turn implies extensional equivalence, as it surely does. Whatever effect may be shown when the ADP is administered, it is wrong to describe this as a “framing effect.” It is also wrong to call the standard pattern of response to the ADP irrational. For the majority of subjects who interpret the sure option as having lower-bounded quantifiers, the sure option in the gain frame (i.e., saving at least 200 out of 600 people) clearly dominates the sure option in the loss frame (i.e., letting at least 400 out of 600 people die).

It would be unfair to single out WCJW2020 for disregarding this. In fact, just since the recent publication of WCJW2020, *Judgment and Decision Making* has published another article drawing on the ADP without mentioning the flaws of this task as a basis for examining framing effects (Zhou et al., 2021). More detrimental impacts are caused by including the ADP or ADP-like problems in batteries intended to measure such constructs as “decision-making competence”, where “going with the frame” is taken as an indicator of incompetence (Bruine de Bruin et al., 2007). Nevertheless, WCJW2020 cites Mandel (2014) and yet does not give any warning to readers that serious problems with the test validity of data from the ADP exist. Critics who might wish to counter the issues raised here might point to the replicability of the “framing effect” (Klein et al., 2014; Steiger & Kühberger, 2018), but this would entirely miss the point. The replicability of the effect is not in dispute. We know it is replicable and we know a lot about the moderators of the effect size. The issue is not whether the effect is reliable, but whether the description of it as a *framing* effect is valid. If we as researchers continue to call this particular effect a framing effect, we will have stripped the term of its proper meaning and will sow further incoherence in a literature devoted to defining requirements for coherent thinking and deciding. That would

be a victory of habit over reason.

References

- Arrow, K. J. (1982). Risk perception in psychology and economics. *Economic Inquiry*, 20, 1–9.
- Bruine de Bruin, W., Parker, A. M., & Fischhoff, B. (2007). Individual differences in adult decision-making competence. *Journal of Personality and Social Psychology*, 92, 938–956.
- DeKay, M. L., Rubinchik, N., & DeBoeck, P. (2019). *Metastudies (multitudes of tiny studies conducted simultaneously) reveal novel, surprising results for the gain/loss framing effect*. SPUDM presentation. <https://osf.io/mabjs/>.
- Frege, G. (1948). Sense and reference. *The Philosophical Review*, 57, 209-230.
- Hastie, R., & Park, B. (1986). The relationship between memory and judgment depends on whether the judgment task is memory-based or on-line. *Psychological Review*, 93, 258-268.
- Kahneman, D. (2000). Preface. In D. Kahneman A. Tversky (Eds.), *Choices, values, and frames* (pp. ix-xvii). New York, NY: Cambridge University Press.
- Kahneman, D., & Miller, D. T. (1986). Norm theory: Comparing reality to its alternatives. *Psychological Review*, 93, 136-153.
- Kahneman, D., & Tversky, A. (1982). The simulation heuristic. In D. Kahneman, P. Slovic, A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 201-208). New York, NY: Cambridge University Press.
- Klein, R. A., Ratliff, K. A., Vianello, M., Adams, R. B. Jr., Bahník, S., Bernstein, M. J.,..., & Cemalcilar, Z. (2014). Investigating variation in replicability. *Social Psychology*, 45, 142-152.
- Kühberger, A. (1995). The framing of decisions: A new look at old problems. *Organizational Behavior and Human Decision Processes*, 62, 230-240.
- Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes*, 76, 149-188.
- Mandel, D. R. (2001). Gain-loss framing and choice: Separating outcome formulations from descriptor formulations. *Organizational Behavior and Human Decision Processes*, 85, 56-76.
- Mandel, D. R. (2014). Do framing effects reveal irrational choice? *Journal of Experimental Psychology: General*, 143, 1185-1198.
- Reyna, V. F., & Brainerd, C. J. (1991). Fuzzy-trace theory and framing effects in choice: Gist extraction, truncation, and conversion. *Journal of Behavioral Decision Making*, 4, 249-262.

- Schneider, S. L. (1992). Framing and conflict: Aspiration level contingency, the status quo, and current theories of risky choice. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 18, 1040–1057.
- Steiger, A., & Kuhberger, A., (2018). A meta-analytic re-appraisal of the framing effect. *Zeitschrift fur Psychologie*, 226, 45-55.
- Teigen, K. H., & Nikolaisen, M. I. (2009). Incorrect estimates and false reports: How framing modifies truth. *Thinking & Reasoning*, 15, 268-293.
- Tombu, M., & Mandel, D. R. (2015). When does framing influence preferences, risk perceptions, and risk attitudes? The explicated valence account. *Journal of Behavioral Decision Making*, 28, 464-476.
- Wall, D., Crookes, R. D., Johnson, E. J., & Weber, E. U. (2020). Risky choice frames shift the structure and emotional valence of internal arguments: A query theory account of the unusual disease problem. *Judgment and Decision Making*, 15, 685-703.
- Wang, X. T. (1996). Framing effects: Dynamics and task domains. *Organizational Behavior and Human Decision Processes*, 68, 145-157.
- Wittgenstein, L. (1953). *Philosophical investigations*. Oxford, England: Blackwell.
- Zhou, L., Liu, N., Liao, Y.-Q., & Li, A.M. (2021). Risky choice framing with various problem descriptions: A replication and extension study. *Judgment and Decision Making*, 16, 394-421.