

SUPPLEMENTARY MATERIAL B: Definitions of key terms in relation to participant understanding

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Definitions of key terms in relation to participant understanding

We define participant understanding as “an overarching concept that can be defined as participants choosing rationally based on comprehending both the choice context and choice task, and being willing to participate. Understanding is impacted by the task design and instructions, the attributes and levels and the choice context, as well as the personal characteristics of the respondents and the familiarity or relevance of the topic.” The relationship between this conceptualisation of participant understanding and other key DCE concepts are provided in the table below.

Table A: Definitions of key terms in relation to participant understanding:

Term	Example definition	Relationship to participant understanding
External validity	“Whether participants would display the same preferences if they were presented with these choices and would subsequently experience the consequences of their choices” [1, p. 531] “External validity is concerned with ensuring the comparability of hypothetical and actual choices” [2, p. 1054]	If participants do not understand the choice scenario, they may answer the DCE in ways that do not reflect their true preferences and thus external validity of the results may be reduced. Similarly, if participants do not comprehend the choice task, or are unwilling to participate fully, they may use simplifying strategies which mean they do not answer in the same way they would if they were faced with the actual choice.
Choice validity	“Choice validity examines whether participants engage with the choice task as expected based on assumptions about consumer behavior. It includes concepts such as monotonicity, compensatory preferences, and task nonattendance.” [1, p. 536]	If participants do not understand the choice scenario or choice task, or are unwilling to participate, the validity of the DCE is reduced as the participants may violate the assumptions about consumer behaviour and engage with the choice task differently to expected.
Choice reliability	“Choice reliability examines whether participants make consistent choices that are in accordance with assumptions about consumer choices. This includes the	Choice reliability may be impacted if participants do not comprehend the choice scenario or choice task, or are unwilling to participate. This may result in responses

	consistency of choice across choice tasks or survey versions and includes concepts such as transitivity, Sen's expansion and contraction principles, and level recoding" [1, p. 537]	which violate (or appear to violated) the assumptions about consumer choices.
Consistency*	"we follow the definition by Carlsson, Mørkbak, and Olsen (2012), and define choice consistency as 'making the same choice in two equal choice tasks'." [3, p. 109]	Poor comprehension of the choice scenario may lead to inconsistent responses if participants are inferring information to complete the choice task. Poor comprehension of the choice task or unwillingness to engage may lead to insufficient attention and inconsistent responses.
Dominance and monotonicity	"the dominance test... where, given researchers' a priori assumptions on attribute level ordering, one of the choice alternatives is clearly superior. Participants who choose the dominated alternative are considered to have failed the test. These participants may not have understood the choice task, may not have paid sufficient attention to it, or may have been exhibiting nonrational choice behavior." [4, p.1092] "'choice monotonicity' is assumed to hold if a respondent chooses a non-dominated alternative in a choice task that contains a dominated alternative, which is a hypothetical alternative that is worse than at least one other alternative in a choice task with respect to all attributes." [3, p. 109]	Participants who do not comprehend the choice scenario or the choice task may choose the dominated alternative thinking it is superior. Alternatively, participants who do not comprehend the choice task or who are unwilling to participate may utilise simplifying strategies resulting in 'failing' a dominance test.
Attribute non-attendance	"One of the heuristics that has been identified in the literature is the tendency to ignore one or more of the attributes in the experiment, a phenomenon that has been labelled attribute non-attendance (ANA)." [5, p. 21]	If participants do not comprehend the choice scenario or the choice task, or are unwilling to participate, they may utilise simplifying heuristics such as attribute non-attendance to complete the DCE.
Robustness	"...the robustness of SP results have prompted many test-retest studies ... in which respondents repeat the valuation process after some interval and the stability of the values derived investigated." [6, p. 442]	If participants do not understand the choice scenario or the choice task, they may utilise simplifying heuristics or give irrational/incorrect answers. This would result in reduced robustness and reduced test-retest reliability or stability.
Completeness*	"The individual has a well defined preference between any two possible alternatives" [7, p. 800]	DCE participants may not display completeness of preferences if they do not understand the choice scenario.
Transitivity*	"For X, Y and Z in C, if $X > Y$ and $Y > Z$; then $X > Z$... This avoids the case of preferences that cycle" [7, p. 800]	DCE participants may not display transitive preferences if they do not understand the choice scenario, do not comprehend the choice task, or are unwilling to participate.
Certainty	"'Choice certainty' henceforth refers to 'stated choice certainty', as it is based on respondents' self-reported answers to a question on choice certainty after each choice task." [3, p. 109]	Participants who have difficulty understanding a DCE may have lower choice certainty, or may display increased variance in their responses.

*Note that these definitions are consistent with the textbook microeconomic definitions of the axioms of utility theory and thus are not unique to discrete choice experiments – see Mas-Collel [8] or Varian [9]

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