Title: Measuring Uniqueness in Open-ended Response Tasks

100 word abstract

Open-ended response tasks provide analytical challenges for researchers, particularly when the research questions focus on response uniqueness (e.g. measuring creativity, assessing exploration or play in complex environments). We define uniqueness relative to such a task, and use this definition to produce the Mass-Adjusted Uniqueness Index (MAUI). We present the measure, discuss its properties, and show the results of analyses using MAUI on representative data. We discuss what can be learned about individual participants, the participant sample, and the properties of the task by using MAUI.

600 word submission

Open-ended response tasks provide analytical challenges for researchers, particularly when the research questions focus on response uniqueness (e.g. measuring creativity, assessing exploration or play in complex environments). We define uniqueness relative to such a task, and use this definition to produce the Mass-Adjusted Uniqueness Index (MAUI). We present the measure, discuss its properties, and show the results of analyses using MAUI on representative data. We discuss what can be learned about individual participants, the participant sample, and the properties of the task by using MAUI.

Imagine a divergent thinking task such as “Think of as many uses as you can for a brick.” This is a standard task in creativity research in which participants are asked to generate as many responses as they can to that question, sometimes with encouragement to “be as creative/original/unique as possible.” Creativity researchers generally define creativity as a combination of fluency (how many responses a participant generates), flexibility (how many categories a participants’ responses fall into), and uniqueness (how much a participants’ responses diverge from other responses). The latter has proved difficult to measure without involving external assessors whose opinions might diverge from other assessors and/or the general population. A commonly used measure that doesn’t require external assessment categorizes every response as original if 95% or more of other participants failed to generate the same response (henceforth called UI95). This measure, however, has several undesirable properties, including an unpredictable measurement range, dependence on sample size, and difficulty in interpretation.

We define uniqueness as the extent to which a response was more infrequently given than other responses in the sample. Suppose a response was given by 3 total participants. Under our definition, it is more unique than every response given 4 or more times, and less unique than every response given 2 or fewer times (and equally unique to responses given 3 times). To measure uniqueness, we calculate the ‘mass’ of responses given 4+ times and the mass of all responses given 3 times. The MAUI for any response given 3 times would be the mass of all 4+ responses plus half the mass of 3 times responses divided by the total mass of all responses given. MAUI has several desirable properties, such as i) the average of MAUI scores for all responses in a sample always equals .5, ii) it is continuous and has a theoretical range is [0, 1], and iii) it is easy to interpret without knowing the sample size.

Our representative data, includes 366 participants who completed the Ten-Item Personality Index (two for each of the Big Five Factors), then responded to 3 divergent thinking prompts, producing 4790 total responses. Each response was scored according to the above descriptions of MAUI and UI95, and the participants received an item score (the sum of the scores of all their responses) for each prompt. In a linear regression, the Big Five predicted participants’ average MAUI scores across the three prompts (*F*(5, 330) = 3.391, *p* < 0.01). In particular, Openness to Experience was positively predictive (β = 0.34, *p* < 0.001) and Conscientiousness was marginally negatively predictive (β = -0.19, *p* = 0.057) of MAUI scores, replicating prior research. A comparison of MAUI and UI95 reveals that the variance of MAUI is smaller than the variance of UI95 for participants across prompts (paired *t*(345) = 3.996, *p* < 0.0001, 95% CI = [0.602, 1.769]). We show several visualizations of MAUI scores from the representative data and discuss how two parameters from a fitted S-curve (the emergent characteristic shape across many open-ended tasks) could be used to understand the characteristics of task prompts and task types in the future.