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The Individual Dynamics of Online Reviews

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We examine the individual level dynamics of online reviews, using a unique data set of real consumer app reviews. We find that a consumer's review is positively related to their rating of the prior app reviewed, while it is negatively related to the quality of the prior app reviewed.

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EXTENDED ABSTRACT

Online reviews have become ubiquitous to consumer decision making. While a lot of research has been devoted to understanding and measuring the impact of online reviews on purchase decisions (e.g. Chevalier and Mayzlin 2006), much less has been devoted to understanding the psychology of the reviewers themselves, and what factors might influence the reviews that they write. In this research, we use insights from the field of psychophysics to better understand the psychology of online reviews, and test these ideas on a unique data set of real online product reviews.

Psychophysics research has shown that, while people are fairly accurate at judging stimuli of different intensities, judgments often depend on the context in which they are made. Judgments often show contrast effects (e.g. Brown 1953; Helson and Kozaki 1968), assimilation effects (e.g. Baird, Green, and Luce 1980; Vuorinen 1973), or a mix of these two, depending on some third moderating factor (e.g. Holland and Lockhead 1968; Jesteadt, Luce, and Green 1977; Sherif, Taub, and Hovland 1958). Most relevant to the current work, various studies have shown that judgments assimilate towards the prior judgment made, but are contrasted away from the intensity of the prior stimulus judged (e.g. Jesteadt et al. 1977; Matthews and Stewart 2009; Ward 1979). This suggests that for online reviews there might be independent effects for the quality of the prior product reviewed and the prior rating assigned to that product. That is, a product may be negatively influenced by the quality of the prior product reviewed, but positively influenced by the star rating assigned to that product.

We test for these contextual effects in online reviews by using a unique data set scraped from the Apple Apps market. The data set is comprised of 11,792,353 reviews written by 6,550,167 unique reviewers for 57,475 apps. Each app in the data set has two independent sets of ratings: 1) a star rating which consists of the marketplace average of anonymously submitted numeric ratings (we use this average as a proxy for app quality) and 2) a series of reviews which consist of a text evaluation of the app, as well as of a star rating. These reviews are tied to a unique Apple ID. Therefore, a specific user's review history can be tracked and analyzed.

We examine the individual level dynamics of online reviews by testing a model first proposed by Jesteadt et al. (1977), which examines the separable effects of the prior rating from the intensity of the prior stimulus. Specifically, we test a regression model where each consumer's star rating for an app is a function of the quality of that app (the average anonymous rating for that app), the star rating that this consumer assigned to the previous app s/he reviewed, and the quality of the previous app s/he reviewed. For example, if a consumer reviews the PacMan app one day, and the Angry Birds app the next day, the model examines how this consumer's star rating of Angry Birds depends on the quality of Angry Birds (its average anonymous rating), the star rating this consumer personally assigned to Pac Man and the quality of Pac Mac (its average anonymous rating). Prior literature in psychophysics suggests that this consumer's rating of Angry Birds (after controlling for quality) should assimilate towards the prior personal rating and contrast away from the marketplace quality of Pac Man.

The results observed are consistent with this prediction. Consumers' ratings for an app are positively related to the rating of the prior app reviewed ($\beta = .05$, $p < .001$), while negatively related to the quality of the app previously reviewed ($\beta = -.06$, $p < .001$). These

findings suggest that well-documented phenomena in psychophysics occur in this much more naturalistic data set. Moreover, in a typical psychophysics study participants rate hundreds of stimuli in rapid succession and thus it is not too surprising that subsequent judgments influence each other. Online reviews, however, are often submitted days or even weeks apart, making it surprising that these ratings influence each other. Subsequent regression analyses showed that these effects are not limited to the immediately preceding review, but that these effects do fade over time, as one would expect from any kind of contextual effect.

In our final analysis, we examine whether these effects are consistent with pure scaling effects – they reflect a change in how the 5-star rating system is used, and nothing else – or whether there is evidence for representational change – a change in the actual beliefs about the app being reviewed (e.g. Lynch, Chakravarti, and Mitra 1991; Stevens 1958). We examine this by testing the regression model specified above, but for the positivity of the text evaluation of the apps instead of the star rating. Consistent with these effects being representational, how positive the text evaluation for an app is, was positively correlated with the positivity of the text evaluation of the prior app reviewed ($\beta = .03$, $p < .001$), while negatively related to the quality of the app previously reviewed ($\beta = -.03$, $p < .001$). The fact that the text review itself is also affected by context suggests that the effects are not pure response scaling effects, but rather they affect the overall evaluation of the app and, at least temporarily, change people's beliefs about the app being reviewed.

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