Visual Novelty and Success in an Online Network of Designers

High-quality creative design work can create tremendous value for organizations. It helps technical products gain acceptance [1] and it often serves as the basis for competition in cultural markets [2]. There has been mounting interest in the use of designers by organizations as a source of value creation [3, 4, 5]. One important ingredient to successful designs is novelty: the degree to which a design is new, original, or unusual relative to what has come before. Indeed novelty is the prime ingredient of innovation and the production of new things [6]. Product innovation seems to have accelerated, and recent studies suggest that successful companies make 80% of their revenue with products younger than five years [7]. Despite its importance, novelty is difficult to measure, especially in the context of creative design. In this paper we investigate three related research questions: (1) how can we measure novelty in digital design, (2) who produces novel work, and (3) what is the relationship between novelty and success. We define and compare different mathematically-grounded measures of novelty or distinctiveness of digital images to better understand its antecedents and subsequent effect on popularity in a community of professional designers.

We collect a large set of images from an online community of professional designers to then propose and evaluate a measure of novelty for digital design at the image level using two feature sets: one capturing content and structure defined using an Inception neural network, the other capturing visual aesthetics using classical compositional features. We take the conventional view that novelty should be defined by comparing an image with previous images, distinguishing it from "timeless" notions like beauty or appeal. We define measures that quantify this difference and hence measure one dimension of distinctiveness or novelty of an image.

With these measures of novelty for digital design in hand, we ask two related questions: who produces novel images? And how does novelty relate to success? The social networks literature makes two suggestions. Individuals with open, diverse social networks have access to diverse sources of information, which they may synthesize in novel ways [8, 9]. At the same time individuals in cohesive, closed networks have greater access to trust and social support, allowing them to more easily take the risk inherent in the creation of novelties [10, 11]. Indeed, recent research on the relationship between social network structure and novelty suggests that the relationship highly depends on context. Empirical evidence suggests that when the domain is quickly changing and when the space of possible novelties is large, cohesive networks facilitate novelty [12, 13]. We argue that our data source is such a domain: the professional nature of the community makes it more difficult to be distinct.

Using a regression framework to analyze temporal data from the online social network of roughly four thousand professional designers, posting approximately 40,000 images, over a period of about four years, we find a positive relationship between the cohesion of a user's network on the site and the novelty of her images. Users in the center of the network make less novel images. We suggest one explanation: that standing out is a form of risk-taking and that local network density facilitates this behavior. Furthermore, we find that novel images are on average less successful, but also that the right network position can reverse this effect.

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