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Different Learning Trajectories for Performance in New Niches: Role of the Breadth and Depth of Experience and Entry Sequence

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Abstract

Studies on the role of experience in new niche entry success are inconclusive whether breadth or depth of experience is useful in entering new niches. This paper argues for looking firm-specific niche entry trajectories to explain contingent benefits experience in entering new niches. Looking to such trajectories requires to have a dynamic viewpoint on how a given level of experience is accumulated, going beyond static models based on experience. I initially integrate past studies to predict that experience types alone will entail a trade-off between them. Following predictions based on dynamic trajectories of niche entry builds on initial static model of experience and addresses how previous related and distant entries in reaching a level of experience shapes capabilities. Based on the frequency of close and distant entries and sequencing of past entries, I offer contingent performance effects of breadth and depth of experience in entering new niches. Initial prediction is supported with analysis of 40 years of niche entry data from US Video Game Industry publishers.

Jelcodes:L25,L82

INTRODUCTION

Within-industry diversification - a firm’s presence in more than one market niche within an industry (Li & Greenwood, 2004) – is a phenomenon that is prevalent in many industries. Such diversification issues are found to be vital for firm survival and growth (Stern & Henderson; Tanriverdi & Lee, 2008; Zahavi & Lavie, 2013). For firms in these industries, key issues are likely to be decision of entering a new-to-the-firm niche, and to leverage existing capabilities in doing so (Mitchell, 1989, 1991; King and Tucci 2002). In general, studies on within-industry diversification have explored how diversification posture determines firm performance. This paper studies how firms learn to enter new niches successfully.

Past research has argued that experience helps in undertaking new niche entry. However, these studies suggest different types of experience to be useful in entering new niches, which could be summarized as breadth and depth of experience. Some find support for the idea that firms could leverage their accumulated experience in current niches (King and Tucci, 2002), and some support the idea that firms could leverage their experience in entering previous diverse niches (Eggers, 2012). On one hand, firms with less niche entry experience may find it hard to expand into a new niche, while on the other hand niche-specific experience may not be effectively applied to another niche. Our understanding of how firms learn to enter new niches successfully is incomplete.

Lack of consideration of relatedness of focal niches entered by the firm in previous studies is a critical boundary condition that is missed. First, it is because relevance of depth of experience in existing niches in entering a new niche depends on relatedness to a focal niche. Second, more importantly, research shows that firms could follow different trajectories to enter new niches, as implied from diversification studies that has a dynamic viewpoint (Teece et al., 1994; Helfat and Lieberman, 2002). On one hand, firms could follow a path of leveraging their experiences in related niches in entering new niches (Chang, 1996); on the other hand they could leverage their more broadly applicable niche entry experience, presumably in entering ever distant niches (Chang, 1995). In turn, this would suggest that what we capture in static models with types of experience misses how firms reached current levels of experience in terms of leveraging related experience or market entry experience in the past, which would determine the success of the focal entry as well.

This study proposes to have a dynamic point of view on how firms enter new niches, where trajectories followed by firms matter in terms of relatedness and timing. Exploring characteristics of previous entry trajectory followed by a firm could enlighten us in understanding whether a firm could benefit a given type of experience or not. Two firms that have followed different trajectories may reach to the same stock of experience, yet path taken is expected to have an effect on their future behavior and success. Thus, it is explored here how different trajectories taken shape capabilities differently. In turn, these differences in capabilities make breadth and depth of experience useful in different contingencies, going beyond the argument of usefulness of a type of experience over the other. Therefore, this study aims to answer questions: (1) Do trajectories of experience accumulation shape capabilities? (2) And if so, under which contingencies they maximize performance in new niche entry?

I develop predictions first by only considering breadth and depth of experience to integrate past studies, and show that considering experience alone is not enough. Following predictions based on dynamic trajectories of niche entry builds on initial static model of experience and addresses how previous related and distant entries in reaching a level of experience shapes capabilities. Based on the frequency and sequencing of past entries, I offer contingent performance effects of breadth and depth of experience in entering new niches.

This study's central contribution to within-industry diversification literature is to theoretically and empirically explore the role of different diversification trajectories and sequences as well as experience on firm performance in expanding new niches. At the same time, it also contributes two other literatures. First, this study contributes to the broader pre-entry experience and entry literature by arguing for and testing learning trajectories (Helfat and Lieberman, 2002) on performance upon entry. Only a few diversification studies have taken the dynamic view (Teece et al., 1994; Chang, 1995; 1996) on entry; however none have discussed how this dynamic view translates to differentially shaped capabilities and success in entry. This study provides basis for further studies that go beyond using static models based on experience, but also considering how firms reached those levels of experience in order to uncover trajectory specific advantages in entering a market. Second, this study contributes to the broader discussion on the role of second order experience as a basis of a dynamic capability. Relationship between breadth of experience and performance has been argued to represent dynamic capabilities in studies on new niche entry (Eggers, 2012), which King and Tucci (2002) termed as transformative experience. I will be showing that it is more likely that there is no specific type of experience that is for general purpose adaptation, but rather contingencies formed by previous entry trajectories of a firm. This idea also corresponds to Eisenhart and Martin's (2000) description of dynamic capabilities as being equifinal, as firms achieve high performance in entering new niches from their unique paths out of other equally possible paths. Findings point to consider a broader skill of managing trajectory of entries that represents new product development portfolio management (Helfat and Raubitschek, 2000; Eggers, 2012).

Empirical setting to test the above theory is the US video game industry since its inception in 1972 until 2011. I will be measuring the performance of publishers in entering new niches (first game in a new-to-the-firm niche). This setting has several useful features to test the foregoing theory: creation of new niches and need to adapt, changes in the popularity of niches, stream of product releases and the need for within-industry diversification by publishers. Publishers undertake the risk and costly commitment of funding and co-developing games with game developers and studios (in-house developers). While publisher are generally active in multiple niches and represent sources of niche entry process knowledge, developers on the other hand represent sources of specific knowledge that is used for developing games. I will be using breadth of market entry experience of publishers and depth of experience of developers to test my arguments. Availability of fine-grained product release and performance data allows tracking the action and the result for each firm. Moreover, product portfolios are meaningful measures for the capability base of the firm dynamically in each time period (Lee, 2008), allowing measuring relatedness. I will be testing my hypotheses on the population of video game publishers that have released at least 1 game in US.

Main methodological and empirical issues are measuring the relatedness of each firm to a focal market, isolating the effect of experience on product performance from other determinants and the last one is self-selection of entrants to enter a new niche. The first issue is addressed by measuring distances through the use of co-occurrence patterns of products within firms (Teece et al., 1994; Lee, 2008; Bryce and Winter, 2009), while the second is addressed through use of firm fixed effects which will measure the effect of within firm accumulation of experience. The last issue is dealt by using a Heckman (1979) method.

THEORY AND HYPOTHESES

Experience and Capability Development in Niche Entry

Firms change the scope of their activities for various reasons: to grow, to adapt and to survive. In order to do so they need to develop capabilities necessary to succeed through experience (King and Tucci, 2002). As niches are also a kind of market entry, the broader literature on the link between pre-entry capabilities and market entry (Helfat and Lieberman, 2002) is useful in understanding drivers of entry and performance. Starting with early theorizing on multiproduct firm (Teece, 1982); it has been argued that capabilities have differing degrees of fungibility. Some capabilities could be leveraged on a wide variety of tasks, while some others could be leveraged only on a given few ones. Helfat and Lieberman (2002), distinguishes these two types of capabilities as specialized and generalized, and note that although capabilities fall somewhere between this continuum, separating out relatively more specialized and generalized capabilities is useful understanding market entry.

Specialized capabilities include technology or product-specific knowledge, or processes that could be leveraged directly in the same or very similar technology or product. In general, it includes activities that are related to specific technology or product know-how of the firm (Helfat and Lieberman, 2002). On the other hand, generalized capabilities include having developed capabilities to enter markets in a given mode (such as acquisition, or greenfield), or being able to transfer knowledge between businesses and so on, which is less market dependent (Helfat and Lieberman, 2002).[1]

This taxonomy of capabilities in pre-entry capabilities literature is helpful in understanding the differences on two types of experience we are considering: breadth and depth

[1] Another categorization of capabilities, as core and complementary (Teece, 1986) overlaps with specialized and generalized capabilities, yet there are also differences. For example, complementary assets could also be specialized to a specific market (Helfat and Lieberman, 2002).

of experience. On one hand, firms would develop more niche-specific capabilities by increasing the depth of their experience in a given niche. This follows a simple learning-by-doing (Arrow, 1962) idea that as firm becomes more experienced in a specific niche, it would improve by applying past knowledge (Kogut and Zander, 1992). As this experience is niche-specific, it would be only effective in another niche to the extent that origin niche is similar. To reflect this, I will be adopting the term of related experience, which I define as the depth of experience in existing niches that are relevant to a focal niche. This would be saying that depth of experience develops specialized capabilities in a given niche, and these capabilities are useful in entry only to the extent of relatedness of focal new niche. On the other hand, firms would develop generalized entry capabilities by entering niches. The more different niches a firm has entered, a broader niche entry experience the firm has accumulated (Eggers, 2012). Such an experience is useful without any niche-specific knowledge, but rather it is about processes of entering a new niche. I will be considering breadth of experience in order to reflect this generalized capability in niche entry.

Leveraging related experience in new niche entry

Firms that are getting more efficient through ongoing activity leverages its underlying knowledge to new related activities is at the heart of diversification studies, since Penrose's (1959) seminal work. This potential for scope economies, combined with contractual hazards, underlie the need for multiproduct firms (Teece, 1980). The value generated from expansion of activity is contingent on the applicability of this specific knowledge on another activity. It is a long held idea in diversification studies that relatedness supports leveraging application-specific capabilities (Silverman, 1999). Coherence in the patterns of how firms bundle their activities and effects of this relatedness has consistently found that firms combine coherent activities in corporate strategy (Teece et al., 1994), industry evolution (Helfat and Lieberman, 2002), and technological innovation (Breschi et al., 2003). Teece et al. (1994) finds that as firms become more diversified, they still keep a level of coherence and Breschi et al. (2003) finds that firms diversify technologically (i.e., patenting activity) to related areas. Helfat and Lieberman (2002) find the strong evidence from a wide variety of entry studies that the match between the firm and the requirements of the focal market in terms of capabilities is an important determinant of entry as well as performance.

A high level relatedness to a focal niche would suggest that the firm can leverage more of its' specialized capabilities, and evidence from a wide variety of studies show that such use of specialized capabilities will improve performance. This is quite consistent with firms that are able to enter new fields where they leverage their previous application-specific knowledge that leads to survival (Klepper and Simons, 2000) and adaptation (King and Tucci, 2002).

Leveraging breadth of experience in new niche entry

Entering new niches would allow the firm to modify its processes and underlying capabilities as: "When new or existing firms enter a market in which they do not currently participate, almost by definition they must develop new capabilities or alter existing ones." (Helfat and Lieberman, 2002: p.726). Experience in routines (Teece et al., 1997) that help the firm integrate (Helfat and Raubitschek, 2000), reconfigure or develop new resources will increase the second-order learning of firms (King and Tucci, 2002). Therefore, firms can develop capabilities that support the organizational change itself (Amburgey et al., 1993) through ongoing practice of new niche entry by developing required processes for identification and reconfiguration (King and Tucci, 2002). This is also supported in the related literature of dynamic capabilities, as Teece et al. (1997) put forward that the capacity to transform could itself be mastered through practice.

A wide variety of studies suggests the value of such experience in entering new markets. Daneels (2002) puts forward that learning to innovate products for new markets are themselves developed as experience is gained about the ability to explore new markets and technologies. Katila and Ahuja (2002) find that the breadth of the search for knowledge increases new product output of the firm, while Nerkar and Roberts (2004) finds that combinations of distal (as opposed to proximal) technological and market experience increases the performance of new products significantly. As a last point, Eggers (2012) have found that increases in the breadth of experience improve performance in entering new niches.

Static View: Trade-off in leveraging breadth of experience and related experience

Considering capabilities developed by breadth and depth of experience, it would be suggested that firms which have high levels of both types of experience would perform better in entering new niches. They could both able to adapt entering new markets through modification routines developed via prior entries, and they are able to leverage prior specialized capabilities by entering a related niche. Yet, going deeper on the evolution of the niches a firm enters would suggest that actually there are possible trade-offs in leveraging both types of experience together.

Research that analyzed distance of markets entered by firms compared to their experience base showed that as firms evolve, they go farther away by using intermediate entries as stepping stones. Such “learning trajectories” (Helfat and Lieberman, 2002) show that firms expand activities close to their core activity until they are more comfortable with expanding. Chang (1995) has shown that firms first enter areas they have highly related knowledge, and then they leverage experience gained in that market to a more distant market. In another study, Chang

(1996) found that firms enter sequentially to markets in order to reach more unrelated markets of interest. Teece et al. (1994) have found that firms enter closely related markets to each other, but in overall firms gather together a highly diversified group of businesses. Chatterjee and Wernerfelt (1991) have found that firms undertake farther entries as they have more generalized resources. Summing up, these studies would suggest that firms would rely more on their generalized capabilities as they increase their breadth of experience. If this would be the case, it could suggest that actually effectiveness of specialized capabilities are reduced as firm accumulates breadth of experience.

Firms engage in activities they are more competent with more frequency, and this first-order learning makes the firm less competent in undertaking other activities (Levinthal and March, 1993). In our case, this would suggest that focused firms are better positioned to undertake further related entries by leveraging their specialized capabilities, whereas broad firms are better at doing distant entries as they leverage the generalized capabilities more often. Such contingent benefits of breadth or focus have been argued previously as well. For example, Siggelkow (2003) finds that focused firms are able to outperform others in market niches where they have related experience. Kim et al. (2013) finds that innovative performance is not only dependent on the diversification mode, but the fit of the search mode to the breadth of the firm, such as local search combining better with a low level of breadth (i.e., focus). These would suggest that firms that leverage their specialized capabilities in entering related markets perform better, while firms that leverage their generalized capabilities in entering distant markets perform better.

Therefore, related experience, which represents specialized capabilities, will be less efficiently leveraged if firm has increased levels of breadth of experience that represents generalized capabilities. Thus:

Hypothesis 1: Increases in the breadth of a firm's experience negatively moderates the positive relationship between related experience and performance in new niche entry.

Learning Trajectories

Evolution of capabilities leveraged through the accumulation of experience forms the basis of the above hypothesis. Now, we will take this idea further to explore capabilities leveraged by firms in reaching a level of experience, rather than inferring them from experience. It is found in market entry studies that capabilities firms leverage in a series of entries itself changes according to learning in each entry in between, which is called "learning trajectories" (Helfat and Lieberman, 2002). I define formally learning trajectory as the path of market entries followed by a firm that reflects frequency and timing of capabilities leveraged in reaching a level of experience.

To build our understanding on how firms follow trajectories in entering new niches, I will be using two main possible main cases, and a combination of these cases. First case involves firms following many related entries to form a breadth of experience. In each entry, firm leverages its specialized capabilities that are relevant for the focal market in order to perform better. Chang (1996) found such trajectories in a study on firm diversification with a dynamic point of view. Firms have leveraged their experience and learning in recent and related markets to diversify in new markets. On the other hand, firms could leverage their market entry experience, which would make them entering distant markets more likely. Chang (1995) has found such trajectories in Japanese firms' entry behavior to US. To integrate these ideas, and simplify our thinking, we will use the Figure 1 below. In that figure R represents a firm has undertaken a related entry, whereas B represents the firm has done distant entry. There are two time periods, and quadrants represent four typologies of firms following each combination of entries in two time periods.

In the above hypothesis, we have actually made a consideration of extreme cases of diagonals II (highly generalized) and III (highly specialized). In that static model based on experience, we argued that as breadth of experience increases, usefulness of related experience decreases. In our figure, as breadth increases from the most focused firm to broadest firm, we can see that also entries undertaken to reach this level of experience changes. If we consider off-diagonal quadrants I and IV as intermediate cases, then lowest breadth (highest focus) would correspond to a firm taking related entries, while highest breadth (lowest focus) would correspond to a firm taking distant entries. Actually, what we measure through experience is then an inference of the capabilities leveraged to reach this level of experience.

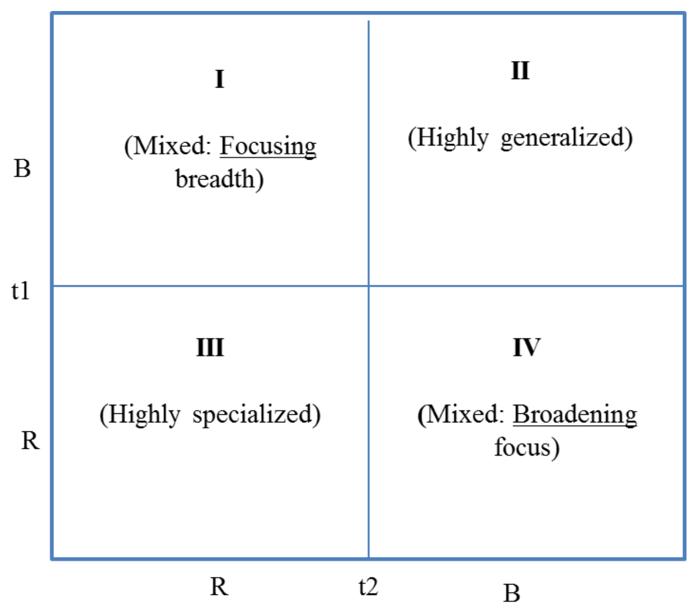

Figure 1. Typologies of Learning Trajectories

However, such an inference will have two consequences: First, it will average out firms that undertake combinations of related and distant entries. Although in our simplified categorization they are represented with one related and one distant entry, normally those firms represent a point in a continuum where any combinations of related and distant entry could be made. So, using experience capture quadrants II and III fully, however it is not able to capture quadrants II and IV where firms could have reached a level of experience by any combination of related and distant entries. Therefore, it misses differences between firms in extreme quadrants versus those in off-diagonals. Second, it will take out the importance of ordering, which is represented by differences in quadrants I and IV. These issues will lead to problems in considering experience types as determinant of success in entering new niches. These firms in each quadrant may have contingent cases where they could enter new niches successfully, and this requires looking at their entry trajectories.

Therefore, the question changes from "What type of experience maximizes performance in entering new niches?" to "What are the different trajectories firms can take in order to maximize performance in entering new niches?" In order to investigate this question, we will be adopting a dynamic view in following hypotheses, where path taken and timing matters in determining performance, given the same breadth of experience and related experience.

Trajectory: Frequency of Related and Distant Entry

As mentioned above, considering the static view of looking at experience takes away from understanding how firms reached their current positions, in terms of related and unrelated entries. Although extreme cases of very broad and very narrow firms will be fully captured, those staying in quadrants I and IV will be averaged out. However, we know from diversification studies that firms show heterogeneity in their diversification patterns (Teece et al., 1994) in terms of related or distant entries.

Firms following different paths will be leveraging their specialized and generalized capabilities to a different extent; according to frequency they are used. For example, a firm that has entered many niches that are close to each other may reach a moderate to high level of breadth of experience over time, but in each of its entries it has leveraged its specialized capabilities by being in the vicinity of the focal niche. Rather, a firm that has entered more distant, but fewer niches, could reach the same breadth of experience, yet it would be leveraging its generalized capabilities in order to modify its routines and processes for each of these entries. Therefore, it is expected that these firms would be adept at using one type of capability over other. Both examples are available in studies considering trajectories of entry. Chang (1996) finds that firms diversify into industries by using many related entries as stepping stones to enter distant markets. On the other hand, Chang's 1995 study on Japanese firm entry in US finds that firms enter initially to industries where they have advantage in core business, and as accumulating market entry experience in US, Japanese firms are relying more on their entry capabilities rather than core business capabilities.

Therefore, we could predict that those firms which followed a trajectory of many related niches are leveraging their specialized capabilities, rather than modifying and reconfiguring their capability bases extensively. On the other hand, those firms which follow a trajectory of many distant entries develop processes for modification, but less likely to leverage their specialized capabilities. This would mean that frequency of related and distant entries shape the usefulness of capabilities formed by breadth of experience and related experience. Formally stated:

Hypothesis 2a: Increased related entries forming a firm's trajectory will positively moderate the relationship between related experience and performance in new niche entry.

Hypothesis 2b: Increased related entries forming a firm's trajectory will negatively moderate the relationship between breadth of experience and performance in new niche entry.

Trajectory: Sequencing

Until now, we have considered differences in quadrants I and IV, compared to cases in quadrants II and III. Last hypothesis considers differences between quadrants I and IV, and this involves the time dimension. Our example firms in quadrants I and IV differ in how they order their related and distant entries. Firms in quadrant IV follows a broadening focus trajectory, in which related entries are followed by distant entries, and firm in quadrant I follows a focusing breadth trajectory, in which distant entries is followed by related entries. Firms in quadrant IV are sequencing their activities incrementally to more distant activities, in which I define sequencing as specified order of niche entries (Bingham, 2009).

Firms sequencing entries do not only have the advantage of learning through diverse entries as discussed in the above hypothesis, but they are also able to learn better from their each entry. This is because firms have higher rates of learning if novel experience is in vicinity of their existing knowledge. Also, it allows better linking recent experiences relevant for upcoming entries by ordering them (Bingham, 2009). For example, Teece et al. (1994) suggests that firms can maximize learning only by going a little further than existing markets and technologies. This argument goes to the heart of the absorptive capacity (Cohen and Levinthal, 1990) argument that the firm is only able to understand and transform the experience after it has accumulated experience at some intensity at the vicinity of new undertaking. In support of this idea, Barkema, Shenkar, Vermeulen, and Bell (1997) finds that firms are able to enter new foreign joint ventures if they have accumulated domestic joint ventures or foreign subsidiary experience, but not foreign joint venture experience as this experience is too “distant” to learn from. Similarly, Chang (1995) finds that Japanese firms can learn to enter non-core businesses in US if they leverage first core businesses to learn entering in US. Following a similar logic to these studies, I predict that following a trajectory sequence of related to distant entries over time positively moderates both related experience and breadth of experience. Thus:

Hypothesis 3a: Sequencing will positively moderate the positive relationship between related experience and performance in new niche entry.

Hypothesis 3b: Sequencing will positively moderate the positive relationship between breadth of experience and performance in new niche entry.

METHODS[2]

Setting: US Video Game Industry

Started from its humble beginnings in early 1970s, US video game industry has become one of the major entertainment industries, reaching to a revenue of 25 billion dollars in 2011 (ESA, 2011). Video game industry has been innovative from its beginning, and still it continues to change today. Optical disk technologies introduced around mid-90s have changed both PC and console gaming, and the ubiquity of the Internet starting from the early 2000s have additionally changed the industry. Meanwhile, hardware improved immensely on both PC and consoles which resulted in games becoming complex to design and the industry has taking the form from one person developered games to the big teams working on blockbuster releases. On one hand it is very important to release the best product in a category in a year as best seller video game releases take the large pie of sales alone, while on the other hand success could be very hard to predict as the industry history is full with unexpected flops and hits. Although in such characteristics this industry resembles other entertainment industries such as film industry, a very important difference in video game industry is that genres and sub-genres are in continuous flux.

[2] Analysis for the trajectory hypotheses is still underway, therefore this version of the paper only includes test of Hypothesis 1 for the results. Rest of the results and discussion is based on expected findings.

New game sub-genres are constantly added to list while popularity of different genres are changing. Moreover, in most genres competition becomes intense after a genre defining game is released (e.g., in FPS genre id Software's Doom, and in RTS genre Westwood Studios' Command & Conquer). Therefore, a video game publisher is faced with multitude of decisions, in terms of where, what, and when to release.

This setting's unique conditions make it very suitable to test our hypotheses. First of all, skills and capabilities developed by publishers and developers are clearly seperate. On the one hand, publishers are mainly interested in funding and marketing titles that will allow them to get bigger in the market. Therefore, publishers are required to enter new niches, and need to adapt the changing popularity of niches in order to stay atop of the game. Publishers require to develop generalized capabilities in entering new niches, rather than focusing on in-depth know-how related to game production in a given niche itself (although in-house development studios publishers own are focusing on the game production itself). On the other hand, developers are required to develop specialized know-how and technologies in order to develop games in their specific niches. Publisher could own this specialized knowledge in the form of inhouse development studios, but whether the developer is integrated to a publisher or not, publishers are combining their generalized experiences in markets together with specialized experience of developers. In sum, specialized knowledge such as graphics engine building, story telling, game mechanic construction that is specific to a niche resides strongly on developers, while market entry, marketing and exploiting specialized knowledge of developers resides on publishers.[3] Therefore, it allows for testing the trade off between generalized capabilities and specialized capabilities without any issues of mechanical trade-off resulting from allocation of experience to

[3] Related experience of publishers will also be included in regressions to show the test of this argument.

breadth versus depth. Also, the setting is ideal in that product performance could be measured through aggregated review scores, the practice which is well accepted also inside the industry as a measure[4] by which bonuses of developers is also based on[5]. Although there has been a recent interest in video game industry as a research setting, these studies typically focused on multi-sided platform economic structures of consoles (Zhu and Iansiti, 2012; Cennamo and Santalo, 2013), while this study is interested in publisher strategies and their learning over time in the market, making it novel also as an empirical setting to study.

Data

The data source used in this study comes from the MobyGames website, which is the oldest and largest online video game archival on the Internet, having almost the population data on all video games released since so far on all known devices. Website has also a well documented policy on contribution about game details, which makes it a reliable source that is also used in past research (Mollick, 2012).

From the population of releases, only those games released in US and those until the end of 2011 have been kept (since information is entered by users on the website, lately released less known titles may not be observed on the site, biasing the sample). Data includes population of firms that had activity in US, and captures the complete history of the industry. Initial dataset consists of 26,145 title-platform releases and with 17,555 unique titles releases over the years 1972-2011. The data includes title, platform, publisher, developer, release date, genre and standardized review score average. Going through the firm histories of publishers and developers

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[4] As an example, THQ Annual Investor Report 2010, http://investor.thq.com/phoenix.zhtml?c=96376&p=irol-reportsannual

[5] Schreier, J., (2012, March 15), "Why Are Game Developer Bonuses Based On Review Scores?", Retrieved from http://kotaku.com/5893595/why-are-game-developer-bonuses-based-on-review-scores

available through Mobygames itself, as well as official sources such as annual reports and other website that catalogue video game information such as GiantBomb, merger and acquisitions and name changes of publishers and developers have been coded to track the experience of firms correctly, as well as to build the control variable relating to inhouse development.

Genre information is provided in 8 top-level genres and additional information about the themes and graphic perspectives of releases. These data have been coded to create meaningful sub-genres, following the genre structure provided by the NPD Research. This firm is the most prominent market research company in the industry that categorized games into over 50 genres, and with the data at hand, I have coded games into mutually exclusive 58 genres that closely follows the NPD Research structure. I considered each of genres or any genre that the publisher didn't released a game in 5 years of time to represent a niche for the firm to enter. In order to test if these niches are indeed represent a different activity, a t-test shows that publishers are performing significantly worse on average if they would have published a game in a niche they already exist in. In order to calculate the experience of publishers and developers as well as the pairwise relatedness index of niches (more on this below), full dataset of 17,555 unique titles have been used. After calculating all the required variables, only those observations that represent an entry to a new niche have been kept. From those remaining observations, games released before 1990 have been dropped, as they rarely have their performance data in the form of review scores, and those review scores available are only for very well known titles, which is a bias. Considering post-1990 period of the industry is also logically consistent with the history of the industry, as the video game industry before 1990 was still in its infancy, with the current structure of the big investments by the publishers and institutions that are formed (e.g., review outlets) are mostly not existent with many one person developed games released by publishers.

After keeping observations with performance data available, also those observations that represent the first year of a new publisher is dropped, as there is no experience to be measured for these firms. This leaves our final dataset with 2393 unique titles released in new to the publisher niche observations that has performance information.

Dependent Variable

A valid measure of product performance would be review scores in video game industry. Moreover, this measure has additional advantages over other product level performance measures such as sales numbers as they are less dependent on complementary assets such as distribution and marketing. MobyGames uses its own proprietary method to calculate MobyRank for titles, by normalizing and weighting differently each review outlet according to their scoring scale, reliability and quality, as well as putting MobyRank score after enough reviews have been done about a release. Moreover, Mobyrank is only available for verified sources making it a reliable summary score.[6]

Independent Variables

Dynamic Pairwise Relatedness Index for Niches

Since our ideas are based on capturing distances, we will need a reliable way to capture distances between niches. Given that there is no SIC alike hierarchical distance categorization for in the industry, we chose to calculate relatedness between niches by calculating cosine index of similarity. Teece et al. (1994) have used co-occurrence patterns of industry activities under businesses to determine their relatedness, in order to improve upon SIC based hierarchical

[6] Full analysis will also provide results with sales for a subset of games as dependent variable as a robustness check.

relatedness measures. Applying the survivor principle[7], it could be argued that those activities that are combined are the ones that make economic sense, and those that don't would be expected to not stay in the market long (Stigler, 1968). Lee (2008) has built on this approach to infer capabilities of firms in determining entry timing from product portfolios. She argues and shows that product portfolios of firms are a meaningful reflection of capabilities and they are useful at both the industry level in determining related activities to each other, and also at the firm level in determining how related a firm is to a focal activity. Product portfolios in an industry reflect both supply and demand conditions (Lee, 2008) capturing them effectively, however it does not provide answer what is the basis of relatedness between two activities (Bryce and Winter, 2009). Following these studies, cosine index of similarity is built by creating matrices of co-occurrences of activity in niches in publisher 5-year cumulative game release portfolios for each year t, and the similarity between two niches i and j at time t is calculated as following: $R_{ijt} = \frac{\sum_{m=1}^{M} P_{im} P_{jm}}{\sqrt{\sum_{m=1}^{M} P_{im}^2}\sqrt{\sum_{m=1}^{M} P_{jm}^2}}$, where m is the publishers currently active in the industry and P_i represents number of product releases by the publisher in the niche i. This similarity index takes value between 0 and 1 for each pair of niches, with 0 being no co-occurrence of pair of niches in the industry by publishers, where as 1 being perfect co-occurrence of pair of niches by publishers. In fact, index of relatedness is simply normalized count of publishers that are active in both niches (Lee, 2008).

(Developer) Related Experience

[7] Survivor principle asserts that economic competition will lead to the disappearance of relatively inefficient organizational forms (Lee, 2008).

By calculating relatedness between each pair of niches, we can calculate the relevant experience of a developer (and publisher as a control) to a focal niche, by what Lee (2008) named as composite degree of capability relevance, which is simply the relevance weighted activities in all markets of the firm according to the focal market. I will be following her, and calculate relevant experience of a developer as relatedness weighted depth of experience of the developer in all active niches according to a focal niche. It could be represented as: $D_{mj} = \sum_{i=1}^{I} D_{imt} R_{ijt}$, where Rijt is the niche i's relatedness to focal niche j at time t, D_{imt} is developer m's number of releases in niche i at time t. Since specialized experience in a niche is fleeting in such a fast changing industry, depth of experience up to t-5 time period have been used in calculating this variable.

Breadth of Experience

Breadth of experience will be calculated via a modified version of concentric diversification index (Caves, 1981) used in past research (Eggers, 2012). It is computed as $B_m = \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} p_i \, p_j (1 - R_{ijt})$, for publisher m where p_i is measuring the past release activity of a publisher in niche i and represents the percentage of niches that publisher had activity in (for example, if a publisher had activity in 10 niches, p_i will be 1/10 for each of these niches) while R_{ijt} is the similarity between niches i and j calculated through the similarity index above.

Related Entries in Trajectory

Relatedness of a focal niche to the publisher starts calculating similar to related experience of developers, and after that this related experience is divided by the maximum possible relatedness score which corresponds to the number of releases by the publisher. It could be represented as: $PR_{mj} = \frac{\sum_{i=1}^{I} P_{im} R_{ijt}}{\sum_{i=1}^{I} P_{im}*1}$ where PR is the publisher m's relatedness to the focal niche j, and P_{im} is the number of releseases by publisher m in niche i, and R_{ijt} is the relatedness score between niches i and j at time t. After calculating the relatedness of entries by publisher to new niches as with this formula, I consider those entries done with a relatedness score higher than the median relatedness in a given year as a related entry for a publisher. Number of these related entries will be used as the related entries in trajectory of the publisher.

Sequencing

Sequencing is calculated by giving higher values for earlier related entries, therefore reflecting the idea that firms sequencing are those following related entries early on. To do this, I will be using a weighted sum of related entries which has been calculated above. Weights will be based on the age of the firm, and I will divide number of related entries at each year in the firm by the square root of the age. Later, I will sum these numbers to reflect the sequencing score of the publisher. It is calculated as: $S_m : \frac{\sum_{a=1}^{A} \sum_{j=1}^{J} PR_{mja}}{\sum_{a=1}^{A} \sqrt{a}}$, where S_m is the publisher m's sequencing score, and PR_{mja} is the relatedness of entries to new niches by publisher m, to each niche j undertaken in publisher age a.

Control Variables

First set of controls relate to the title level. Video games can be exclusively released for a single platform. These games could differ on the benefits to the platform, but also title quality could be affected by such exclusivity (Cennamo and Santalo, 2013). Games could be also based on original IP, which is a new game series developed by a firm, compared to the ones that are based on a movie or other licenses (such as Harry Potter, Star Wars or Lego), or a game could be a sequel. Since these factors are effective in the evaluation of a game, they need to be controlled. Similarly, a game could be an expansion pack to a previously released game. Accordingly, for all of these factors, dummy variables of Exclusivity, Licensed Title, Sequel, Add-on have been used to control their effects.[8] Besides these, most important title level factor could be the project size itself. It would be expected that the game would be a better title as more resources are used to produce it. Project Size variable has been calculated by using credits information on Mobygames, which is the ratio of the number of people worked on the title compared to other titles in the same year. Since credits information is not available for all games, those games that do not have this information have been given the ratio of 1, yet they have been coded in a Assumed Size dummy variable in order to control for the bias introduced by this (Mitchell, 1989).

At the developer level, there are three important controls: one controlling for the corporate ownership of the developer (if the developer is owned by the publisher or not), named as inhouse, and the other one controlling if developer has past experience in the niche itself and if it has, how many games it has released in the niche, named as Developer Experience Depth. Developer age and its squared terms is also included as controls.

Control variables are also needed to control for competition inside each subgenre as well. For this total release number of games in the same genre with the focal game have been calculated as other releases in genre. Also, genre density have been controlled by including

[8] Since we are looking at publishers, a sequel or add-on could well be a new to the publisher, as games have almost always same developers, but publisher changes due to various reasons (failure, acquisition, better deal etc.).

cumulative number of releases up to t-3 periods, but it is found to be highly correlated with the above variable, and therefore dropped. Results do not change in either case.

At the publisher level, publisher age have been controlled. More importantly, publisher-level fixed effects have been used for publishers in order to show how within accumulation of breadth of experience differs firm performance and the trade-off with related experience in entering new niches. Also, publisher related experience have been controlled for if our idea that developers are the source of specialized capabilities or not.

As a last set of control variables, dummies have been created to control for year-specific, genre-specific, and platform-specific effects on the review scores. Some genres could be viewed more favorably compared to others, as well as the same is true for platform. As for the years, there could be years in which competition by a multitude of blockbuster games could affect all the review scores regardless of niches.

RESULTS

Summary statistics and correlations are presented in table 1. There appears no concerning correlation between variables, and those correlations represent a meaningful relationship between variables. For example, sequels are more likely to get a higher score, which makes sense as a sequel is made after the success of an initial release. It can be seen that both breadth of experience of publisher and related experience of developer is positively correlated with review scores.

Insert Table 1 About Here

At table 2, publisher-fixed effects OLS regressions for testing the hypothesis 1 are presented. In the first model, there are only control variables. Most of the controls are significant and have an important effect on the performance of a title by a publisher in a new niche. First of all, publisher related experience is found non significant, supporting our argument that related experience resides in developer in our setting. Licensed titles generally tend to score lower, which could be related to their less innovativeness in terms of game mechanics and instead their reliance on the license itself (e.g, box office movie tie-in games). Exclusivity is not good either, this may be due to incentive problems as told in Carmelo and Santalo (2013). Project size behaves as expected, while it is clear that games do not have credits data are those less succesful or smaller titles, and this bias is captured by the dummy variable. Inhouse projects are both significantly and competitively better, which could be the sign that actually inhouse studios better compared to 3rd party developers, or publishers acquire those studios that are better in game development. Those games released in niches where developers have previous experience receives a huge boost, which is expected. Interestingly, competition in the form of total releases in the same genre in the year is not significant. It could be that competition in terms of review scores is determined by quality, rather than by quantity in a given genre and year.

Insert Table 2 About Here

Model 2 includes publisher experience breadth and developer related experience variables in addition to control variables in Model 1. Publisher breadth of experience is significant in the expected direction, supporting findings of Eggers (2012), and the theoretical discussion above on the usefulness of generalized capabilities developed by previous modification experience. Also, developer related experience is marginally significant, showing support for the idea that related experience is also a driver of performance in entering a new niche. Model 3 includes the interaction effect of publisher experience breadth and developer related experience to test our hypothesis 1. The interaction effect is significant and is in the expected direction, as well as developer related experience becomes more significant after the interaction is added. Therefore, hypothesis 1 is supported. Increased breadth of experience within the publisher helps it to make better new niche game releases, yet it reduces the benefits gained from the related experience of developer.

In order to check the robustness of our findings, we have decided to also run a two-stage Heckman (1979) regression in order to alleviate the issue of the self-selection of publishers into diversifying in new niches, which could affect the results. Although such self-selection could explain the effect of breadth or relatedness, still there is no a-priori reason it should affect the interaction effect. Findings from the probit model of publisher entry to a new niche could be found in the table 3. There are 9,554 unique title releases by publishers that are released in their 2nd year onwards with performance data, which is included to this entry model and 1657 publisher new niche releases that has information on the entry model variable of performance relative to social aspiration level. In order to have an independent variable that could explain market entry that is not included in the main regressions, we have decided to use the performance relative to social aspiration levels[9] (Greve, 1998), as behavioral theory of the firm suggests that firms over-perform or under-perform compared to their peers would induce more risk and change by initiating slack-search and problemistic-search respectively. Performance relative to social aspiration level is simply the difference between the average performance of the publisher and the average performance of the industry in the given year (as with all other

[9] Calculating historical aspiration levels ended up with loss of too many observations, and therefore it has been opted to use social aspiration levels only.

variables, it has been lagged to avoid simultaneity problems). Also, cumulative releases in the genre in previous three years have been used if niche attractiveness/competition would drive or deter entry by publishers. Results show that social aspiration levels are not significant related with entry decision, while cumulative releases are deterring publishers in entering these niches. Exclusive releases are a good motivation for publishers to enter new niches, while inhouse releases are generally preferred in existing niches.

Insert Table 3 About Here

Second-stage publisher fixed-effects regressions including the lambda self selection paremeter from the first-stage could be found it table 4. Model 1 of table 4 replicates the Model 3 of table 2, and it shows that even after accounting for self-selection our hypothesized negative interaction between publisher experience breadth and developer related experience persists.

Insert Table 4 About Here

Other hypotheses about learning trajectory are expected to be confirmed when: (1) related entries in trajectory of the publisher interacts positively with the developer related experience and negatively with the publisher breadth of experience, (2) sequencing of entries by the publisher interacts positively with both developer related experience and publisher breadth of experience.

Robustness checks will be undertaken by using a different dependent variable (sales), and using alternative calculations for independent variables, as well as other checks such as the stringent condition of using developer fixed effects as well.

DISCUSSION AND CONCLUSION

This study addresses how trajectories of experience accumulation affects impact of experience in entering new niches, and does so drawing upon literatures on learning and capabilities in market entry. Current findings support hypothesis 1, which predicted reduced effectiveness of specialized capabilities as generalized capabilities accumulate, tested in the form of publisher breadth of experience and developer related experience. First of all, firms did indeed benefit from their past entry experience in within-industry diversification, supporting the study of Eggers (2012) and transformational experience of King and Tucci (2002). Publishers in our sample were able to make better entries to new niches as they have accumulated market entry experience by entering ever different niches. Also, value of specialized experience through related entries is supported. Developers that have the specialized experience on niches were improving the performance of games released in new niches by publishers if they have related experience. This is supportive of many market entry studies as surveyed by Helfat and Lieberman (2002): the match between resources and capabilities owned by the firm and required ones in the focal market is the main determinant of entry and success. Results from the industry show that publishers leverage their generalized capabilities while resource match for specific niches is important for developers.

Our further analysis will be uncovering learning trajectories to understand equifinal possible paths that firms could follow in order to maximize their performance in entering new niches. If findings will support those hypotheses, then it will have important implications for literature capabilities in market entry. Learning trajectories seem to be available in diversificaiton, geographic expansion and niche entry (Helfat and Lieberman, 2002). As far as these literatures concerned, studies have almost only considered static models based on experience, perhaps except studies on geographic expansion. Also, uncovering contingent effects of such trajectories could help us in understanding better, what kind of capabilites considered as dynamic, rather than inferring from an experience type such as market entry breadth the reconfiguration and intergration processes (King and Tucci, 2002; Eggers, 2012).

A limitation of the study is due to the high turnover of products and changing popularities of niches, as they affect the constrution fo the similarity index. Although survivor principle (Teece et al., 1994; Bryce and Winter, 2009) would ensure that infeasible co-occurrences of products would be deleted from market due to adaptation by the firm or due to the failing of the firm, a robust similarity index requires a frame of reference defined by successful entrants in a niche (Lee, 2008). Product portfolios of these successful entrants show which combinations of products are a sign of required resources and capabilities to succeed in a given market. Unfortunately, given the structure of the industry, this was not possible, and more noisy method of using entrants in every 5-year window have been used to build the similarity index. Yet, in the within-industry diversification literature, Greenwood and Li (2004) have built the similarity index in a similary way, arguing for the sociological side of these co-occurrence patterns, which will create needed institutions that support the firms that undertake activity in highly related niches through their co-occurrences. There are also possible limitations due to the industry for the implications of results. Although there are many niches in the video game industry, developers are much more constrained in applying their specialized knowledge to new niches, while publishers are more in the role of a renaissance patron that may not need for them to have that much specialized knowledge, as much as knowing about how to enter new niches in general. This has benefited in looking to different entities for the generalized and specialized capabilities, yet study could be replicated in a setting with both type of capabilities exploited in entering new markets to see if results would hold, or differ in which sense. A last limitation pertains to the selection of developers by publishers, which is not unlike alliance partner selection issues.

Findings of this study so far have dual implications for the within-industry diversification. Firms may indeed benefit from their breadth in entering new markets, but in doing so, they should be noting that they would lose to able to benefit more from the specialized experience of developers. This could be very well the reflection of the anger against big publishers in the video game industry as they have been blamed to ruin smaller succesful developers by integrating them to their own organizational structure, and pushing them to produce more of what they have produced in the past, which caused a drastic decrease on chances of developing highly acclaimed titles.

We believe that evolution of industries by analyzing co-evolution of products, firms and their path-dependent nature have a high potential to bring answers to many old questions, and able to revitalize our view on industry evolution, diversification and organizational learning.

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Table 1
Descriptive Statistics and Correlations

Variables	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Performance	56.2	13.4	1														
2. Exclusive	0.64	0.48	-.01	1													
3. Licensed Title	0.27	0.45	-.10	-.30	1												
4. Add-on	0.02	0.13	.05	.06	-.01	1											
5. Project Size	0.97	0.39	.07	-.10	.09	.01	1										
6. Assumed Size Dummy	0.57	0.5	-.10	.27	-.10	.11	.10	1									
7. Inhouse	0.27	0.44	.18	-.10	.07	.05	.09	-.10	1								
8. Sequel	0.06	0.24	.09	.08	-.10	-.01	-.10	-.30	.03	1							
9. Publisher Age	11.3	6.87	.04	-.20	.11	.03	.02	-.20	.16	.09	1						
10. Genre density	25.9	24.4	-.10	.05	-.10	-.01	-.10	.08	-.10	.01	-.20	1					
11. Publisher Experience Breadth	0.29	0.06	.04	-.10	.11	.01	.06	-.10	.07	-.01	.48	-.20	1				
12. Developer Related Experience	0.65	0.75	.08	-.10	.06	.01	.04	-.10	.33	.09	.08	-.01	.01	1			
13. Developer Experience Depth	0.26	0.68	.09	.02	.02	.05	-.01	.05	-.10	.04	-.01	.07	-.01	-.10	1		
14. Publisher Related Experience	10.2	10.7	.04	-.10	.14	-.01	.12	-.10	.13	-.01	.41	-.20	.44	.14	-.10	1	
15. Developer Age	5.59	5.66	.07	.01	.02	.06	.01	-.10	.37	.11	.24	-.10	.12	.50	.12	.10	1

Correlations greater than .05 are significant at $p < .05$

Table 2
Results for Fixed-effects Regressions for New-to-the-Publisher-Niche Release Performance[a]

Variables	Model 1	Model 2	Model 3
Exclusive	-1.40† (0.71)	-1.26† (0.72)	-1.37†(0.72)
Licensed Title	-3.64**(0.74)	-3.54** (0.74)	-3.52** (0.74)
Add-on	2.01 (2.22)	1.83 (2.22)	1.84 (2.21)
Project Size	1.34† (0.75)	1.43† (0.75)	1.53* (0.75)
Assumed Size	-2.16** (0.77)	-2.14** (0.78)	-2.18** (0.77)
Inhouse	3.80** (0.78)	3.84** (0.78)	3.92** (0.78)
Sequel	3.44** (1.27)	3.28** (1.27)	3.27** (1.27)
Publisher Age	-3.30 (2.91)	-4.30 (2.93)	-4.55 (2.93)
Genre density	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)
Developer Experience Depth	2.15* (0.43)	2.38** (0.45)	2.44** (0.45)
Publisher Related Experience	-0.00 (0.04)	-0.02 (0.04)	-0.01 (0.04)
Developer Age	-0.30* (0.14)	-0.47** (0.17)	-0.47** (0.17)
Developer Age^2	0.01 (0.01)	0.02† (0.01)	0.02† (0.01)
Publisher Experience Breadth		1.64* (0.67)	1.74** (0.67)
Developer Related Experience		0.64† (0.38)	0.90* (0.39)
Developer Related Experience X Publisher Experience Breadth			-0.89* (0.36)
Constant	118.24*(55.00)	136.27*(55.32)	140.75*(55.28)
F	3.81**	3.83**	3.86**
Within R2	0.18	0.19	0.19
F for publisher fixed effects	1.78**	1.78**	1.78**

[a] n = 2393 publisher new niche game release (entry) observations; number of panels (publishers) = 367. Year, genre, and platform dummies were included in all models but are omitted from the table for readability. All variables that are used for interaction effects have been standardized to alleviate collinearity issues.

† p < .10
* p < .05
** p < .01

Table 3
First Stage Probit Model for Entering a New to the Publisher Niche[a]

Variables	**Probability of Entering a New Niche**
Exclusive	0.24**
	(0.04)
Licensed Title	-0.19**
	(0.04)
Add-on	-0.74**
	(0.10)
Project Size	-0.11**
	(0.04)
Assumed Size Dummy	-0.08*
	(0.04)
Inhouse	-0.43**
	(0.04)
Sequel	-0.31**
	(0.07)
Publisher Age	-0.024**
	(0.00)
Genre density	-0.00**
	(0.00)
Past Genre density	-0.01**
	(0.00)
Social Aspiration	0.00
Performance	(0.00)
Constant	0.06
	(0.06)

[a] n = 9554.
† p < .10
* p < .05
** p < .01

Table 4
Results for Second-Stage Fixed-effects Regressions for New-to-the-Publisher-Niche Game Release Performance[a]

Variables	Model 1	
Exclusive	-1.54	(1.35)
Licensed Title	-3.96**	(1.22)
Add-on	1.41	(4.24)
Project Size	-0.09	(1.05)
Assumed Size Dummy	-1.42	(1.01)
Inhouse	5.08*	(2.11)
Sequel	3.63†	(2.01)
Publisher Age	-5.09	(3.19)
Genre density	-0.03	(0.05)
Developer Experience Depth	2.08**	(0.52)
Publisher Related Experience	0.04	(0.05)
Developer Age	-0.38†	(0.20)
Developer Age Sq.	0.01	(0.01)
Lambda	-0.38	(5.59)
Publisher Experience Breadth	1.55†	(0.88)
Developer Related Experience	0.48	(0.49)
Developer Related X Publisher Breadth Experience	-0.86†	(0.48)
Constant	152.44*	(59.23)
F	3.51**	
Within R2	0.23	
F for publisher fixed effects	1.86**	

[a] n = 1657 publisher new niche game release (entry) observations; number of panels (publishers) = 229. Year, genre, and platform dummies were included in all models but are omitted from the table for readability. All variables that are used for interaction effects have been standardized to alleviate collinearity issues.

† $p < .10$
* $p < .05$
** $p < .01$