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Older sisters and younger brothers: The impact of siblings on preference for competition

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ABSTRACT

Psychology studies have long argued the possibility that sibling structure, such as birth order and the sex of siblings, shapes one's personality traits. One of the core issues involved is that of who rates subjects' personality traits in studies. The present studies ($N = 135$ in Study 1, $N = 232$ in Study 2) surpassed the examinations performed in previous studies by obtaining information regarding one of the key personality traits, preference for competition, using a framework developed via experimental economics rather than subjective ratings. Despite the fact that the two studies involved different types of task, we consistently observed that older sisters exerted a significant impact on their younger siblings in both studies. In particular, having an older sister was negatively associated with men's competitive preferences. We also obtained suggestive evidence that having an older sister was positively associated with women's competitive preferences. Our results support sibling hypotheses from the perspective of experimental economics.

1. Introduction

According to some psychologists, sibling structure is an important environmental contributory factor in personality. Specifically, sibling structure engenders a systematic trend in the personality traits of those whose siblings follow specific gender patterns. One example is the role-assimilation theory formally analyzed by Brim (1958). Based on a series of observational studies by Koch (1954, 1955a, 1955b, 1956a, 1956b, 1956c, 1956d) on primary school students and their siblings, Brim (1958) reported a tendency for mixed-sex sibling pairs to assimilate traits more typically associated with the opposite gender. For instance, older girls with younger brothers displayed more masculine traits (i.e., competitiveness and self-confidence) relative to their counterparts with younger sisters. Similarly, boys with older sisters exhibited more feminine traits (i.e., kindness and cooperation). Interestingly, this effect was stronger for older sister/younger brother pairs relative to older brother/younger sister pairs. While the role assimilation effect between cross-gender sibling pairs could not explain this particular trend exclusively, similar phenomena specific to the relationships between older sisters and younger brothers have been raised in other psychological studies analyzing home-based activities in school-age children (Stewart, 1983; Stoneman, Brody, & MacKinnon, 1986). These studies typically showed that pairs containing older sisters exhibited the greatest role asymmetry, as older sisters often played the roles of managers or meddlesome caretakers.

Sulloway (1996) provides a possible explanation for this trend by suggesting that the effects unique to older sister/younger brother relationships arise due to a combination of birth order and role taking. Sulloway's (1996) rationale for the effect of birth order on personality traits is based on the notion of sibling competition in evolutionary science. Based on Darwin's principle of divergence, Sulloway (1996) argues that the strategies siblings use to attract parental investment depend on birth order, which ultimately shapes their personality traits. Specifically, firstborn children tend to be more dominant, aggressive, ambitious, and conservative relative to later-born children. This is intended to meet their parents' expectations and standards, thereby defending

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their stakes against younger rivals with regard to the allocation of parental resources. Therefore, firstborn children, regardless of whether they are male or female, emerge as "alpha males" in their sibling systems (Sulloway, 1996). This could explain why Brim (1958) observed a stronger "role-taking effect" in older sister/younger brother pairs relative to older brother/younger sister pairs, as the effect of role taking is more gender incongruent when the firstborn is female and the laterborn is male.[1]

However, it is important to note that some psychologists disagree with the view that sibling dynamics, particularly birth order, systematically influence personality traits. In fact, this issue is the subject of one of the longest debates in psychology. Although the effects of birth order on personality were first observed by Adler (1928) and have since been tested in thousands of studies, Ernst and Angst's (1983) review of the literature concluded that there were only negligible birth order effects across personality variables.

One of the ongoing issues involved is that of who rates subjects' personality traits in studies. The literature has indeed reported mixed evidence, implying the sensitivity of the results in using personality inventory scores to detect birth order effects. At most, Jefferson, Herbst, and McCrae (1998) found a negligible effect of birth order on self-rated personality traits in a large representative sample; however, they also reported that, in peer-rated traits, laterborns scored higher in Openness and Agreeableness. Although Marini and Kurtz (2011) found no significant effects of birth order on peer, parent, or self-rated Neuroticism-Extraversion-Openness Five-Factor Inventory scores, Saroglou and Fiasse (2003) found that middleborns were less religious and conscientious in both self and mother ratings. A prevailing explanation for the discrepant findings is that these studies failed to account for differences in socioeconomic backgrounds across families. In fact, some reported observations consistent with Sulloway (1996) when family backgrounds were controlled for in a within-family design (Healey & Ellis, 2007; Paulhus, Trapnell, & Chen, 1999). However, even if one could control for family-specific characteristics, evaluators' prior knowledge regarding birth order could also contaminate results. As Ernst and Angst (1983) suggested, parents, influenced by popular birth order views, could rate their children accordingly. This problem cannot necessarily be addressed by asking about birth order once respondents have rated their siblings' personalities, which was the approach used in some within-family studies (Beck, Burnet, & Vosper, 2006; Paulhus et al., 1999). Being asked to rate one's own and a sibling's personalities may evoke "the indirect suggestion that birth order differences are expected" (Marini & Kurtz, 2011, p. 913).

This study surpassed previous psychological studies by obtaining information regarding one of the key personality traits, preference for competition, using a framework developed via experimental economics rather than subjective ratings.[2] In our experiment, Japanese high school students were asked to solve as many mazes as possible in several tasks that used different payment schemes (Study 1, $N = 135$). In order to examine whether individuals would opt for a competitive environment, prior to their solving the mazes, the experimenter asked them to indicate whether they preferred to be compensated via piece-rate payment or a tournament payment scheme. As reward via the tournament scheme depended on the performances of the other members in a randomly assigned group, the choice to enter the tournament scheme represented a voluntary choice of competitive environment. We then determined which factors, including sibling structure, accounted for tournament scheme choice and tested whether the long-debated sibling hypotheses in psychology could be supported from an experimental economic perspective. These hypotheses were also tested on a dataset taken from another experiment, in which university students engaged in math-solving tasks with a very similar incentive scheme (Study 2, $N = 232$).

Of course, the mere choice of the tournament payment scheme does not immediately indicate that a subject has a higher preference for competition. Voluntary choice of tournament payment could arise as a result of many other factors. Subjects may opt for a competitive environment because they know that they possess superior ability or enjoy taking risks. This complicated our analysis, as all other factors could also be driven by birth order or the sex of siblings. According to the literature in both psychology and economics, older siblings have an influential effect on the development of younger siblings' cognitive abilities (Azmitia & Hesser, 1993; Maynard, 2002), and this effect is known to be heterogeneous across sexes in older siblings (Dai & Heckman, 2013). Similarly, risk-taking behavior could also be affected by sibling constellation. Consistent with the view that siblings use various strategies to attract parental investment (Sulloway, 1996), they reported that later-born siblings were more likely to take part in high-risk activities (Longstreth, Longstreth, Ramirez, & Fernandez, 1975; Perkin, 2003; Sulloway & Zweigenhaft, 2010). Considering that tournament choice involves the risk that subjects could lose their rewards, there was a possibility that tournament choice in our experiment would represent the extent of subjects' risk tolerance rather than their preference for competition.

Overcoming this point was one of important contributions made by the present study. By adapting the experimental framework proposed by Niederle and Vesterlund (2007), we distinguished preference for competition from other possible confounding factors. In the following analysis, we examined whether sibling constellation contributed to the construction of competitive preference, even after controlling for its effects on other factors such as ability or extent of risk aversion.

2. Study 1: maze-solving task

2.1. Method

2.1.1. Subjects

One hundred thirty-five students from four high schools in the Kyoto area of Japan participated in the study (male = 41, female = 94). The mean ages for male and female subjects were 16.9 years (age range: 15–21 years) and 16.8 years (age range: 15–18 years), respectively. Subjects attended one of four sessions, which took place on July 16 and 22 and October 1, 2011. Five confederates took part in the experiment to make up for last-minute subject withdrawal, as the experiment required groups of four subjects. Data from the confederates were excluded from the analysis. Each subject was assigned to a group, completed tasks that involved solving as many mazes as possible, and was awarded

[1] Sulloway's (1996) notion of the effect of birth order on one's personality has inspired many empirical studies. Catherine Salmon and her coauthors further elaborated on the idea and showed that middleborns fare even less well than lastborns and are therefore less closely connected to family members, as parental investment of resources disproportionately favors lastborns, who do not need to compete against younger siblings for parental resources (e.g., Salmon, 1999; Salmon, 2003; Salmon & Daly, 1998; Salmon, Shackelford, & Michalski, 2012). Birth order studies have also varied in their approaches, such as those involving the analysis of the effects of birth order on risk taking behavior in baseball and those involving the examination of these effects on income redistribution preferences (Sulloway & Zweigenhaft, 2010; Yamamura, 2014).

[2] We consider that preference for competition is a key personality because it is tightly linked to a basic achievement motive (Spence & Helmreich, 1983). In fact, psychology literature has attempted to measure competitive traits for more than a century, proposing several inventory scores and examining their relationships with a major personality inventory (Fletcher & Nusbaum, 2008; Houston, McIntire, Kinnie, & Terry, 2002; Schmit, Kihm, & Robie, 2000). Recently, economics literature has also reported the importance of competitive traits, by showing that the gender gap in preference for competition constitutes a non-negligible reason why women are generally underrepresented on the career ladder (Booth, Cardona-Sosa, & Nolen, 2014; Buser, Niederle, & Oosterbeek, 2014; Gneezy, Leonard, & List, 2009; Niederle & Vesterlund, 2007; Tamiya, Lee, & Ohtake, 2012; Wozniak, Harbaugh, & Mayr, 2014).