Risk-taking behavior in monolingual vs. bilingual children: an experiment

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Abstract

The effect of language on economic behavior is an area of research recently brought to public attention. Previous studies have touched upon the effect of language on risk attitudes, though this behavior in children has been studied to a lesser extent. Observing differences in language skills in children may indicate differences in developmental gains, and therefore an understanding of economic concepts. In a controlled experiment, conducted amongst a sample of 20 monolingual and 20 bilingual children aged 8-12-years old in Stockholm, risk-taking propensity was observed. The results indicate that bilingual children presented more risk averse behavior, and monolingual speakers of languages with weak future time references were similarly so. In accordance with previous research, girls were generally more risk averse than boys, and older children more so than younger. Supplementary background information was gathered, though not for the complete sample, which rendered some inconclusive results, but also indications of parental background having effects on risk attitude. As this generation's children are becoming more influential in families' consumption patterns and beginning to make their own financial decisions, an awareness of the relationship between language and economic behavior could lead to implications in education and policy making and an understanding of how economic behavior develops over time.

Keywords

Risk preference, risk taking, behavioral economics, bilingualism, children, gender.

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1. Introduction

Risk-taking is a ubiquitous part of human behavior since numerous relevant economic and strategic decisions and interactions contain an aspect of risk (Gong & Yang, 2012). The expected utility derived from a certain choice is vital to economic analysis, policy prescription and behaviorally driven theories (such as prospect theory). While researchers may differ in the definitions they provide for risk, the general agreement is that two things must hold true. Furby and Beyth-Marom (in Byrnes, Miller & Shaffer, 1999) define risk-taking as such:

> "a) the behavior in question could lead to more than one outcome and
> b) some of these outcomes are undesirable or even dangerous" (p. 367)

The above description of risk-taking is consistent with the view that risk takes place in daily life, allowing for a wide range of behaviors to be qualified as instances of risk-taking. Also, as individuals are observed as having differing attitudes towards risk, risk preference is recognized as a free parameter, allowing for individual measurements to be made. This renders risk preference applicable to being studied in younger children, between ages, and changes in risk attitude over time. Considerable debate has also been conducted on whether differences in risk attitudes "are attributable to nature or nurture, or some combination of both" (Gong & Yang, 2011). If some behaviors are innate, they might only be redirected by changes in remuneration. If other behaviors are learned, changes in educational or training contexts may be more beneficial (Booth & Nolen, 2012). Thus, understanding how decisions are made under risk could give additional insight into policy construction and educational frameworks.

The main focus of this paper will be the economic behavior of children; more specifically monolingual and bilingual children's risk preferences. It is thought that children at a young age (i.e. before the age of adolescence and responsibilities such as scholarship/ college applications, driving licenses, part-time jobs etc. come into play) do not possess the skills needed to execute financial decisions and lack the understanding of financial agents such as banks and savings accounts (Shim, Serido & Barber, 2011). However, Friedline (2015) dismisses this view providing evidence suggestsing that children are "developmentally capable of saving by age five or six" (p. 39) and thereby acquire economic responsibility and decision-making skills. Harbaugh, Krause and Vesterlund (2002) similarly find that children at the age of six are able to evaluate probabilities and

the size of the prize in their decision-making processes. Friedline (2015) provides evidence for a link between developmental gains in children and gains in economic knowledge, i.e. "children learn to recognize and categorize coins in phases just like their acquisition of knowledge about spending, profit and interest rates" (p. 43). These developmental gains occur not only cognitively, but also socially and linguistically. Shim et al. (2011) likewise point out that the newest generation of children and adolescents also constitute the newest generation of consumers. Their behavior is to a higher degree than that of the previous generations influenced by new means of consumption (such as the internet). It is important to consider children (i.e. not only adolescents) as economic agents who not only spend, but are capable of saving, investing and influencing purchases as well (Friedline, 2015; Shim et al. 2011; Flurry, 2007; Harbaugh et al., 2002). As the economic behavior of children is an area of little research, attention should thus be brought to the economic behavior of children to not only understand how children act in financial situations, how policies can be built to accommodate and teach them about money but also what consumption patterns and choices are made by this generation's children.

With the publication of Chen's (2013) article that controversially[1] found a correlation between economic behavior and language, light was shed on what had previously been a small field of behavioral economics and the intersection of two disciplines: linguistics and economics. The findings of Chen's study concluded that speakers of s-FTR languages[2] (standing for strong future time reference, i.e. languages with a strong future tense such as English) have lower savings rates than that of w-FTR (weak future time references, such as Swedish). Legetporer, Sutter, Angerer and Glätzle-Rützler (2014a) based their study on Chen's as they investigated language's effect on children's intertemporal choices, where the languages spoken were German (w-FTR) and Italian (s-FTR). Legetporer et al. (2014a) claim themselves to be the first in studying the effect of language on intertemporal choice in children, and as such, the present paper will contribute to the field of research within language and economic behavior.

[1] Chen's (2013) regressions have been criticized for being misleading in (primarily) non-scientifically published forums such as linguistics blogs http://languagelog.ldc.upenn.edu/nll/?p=3756 , http://dlc.hypotheses.org/360 and http://www.replicatedtypo.com/whorfian-economics-reconsidered-why-future-tense/5988.html

[2] The classifications of strong vs weak FTR languages in this paper follows Chen's categorizations in https://www.ldc.upenn.edu/sites/www.ldc.upenn.edu/files/chen.pdf for purposes of consistency.

Risk-taking has been studied in children amongst other variables of interest, such as time preferences and altruism (Legetporer et al., 2014b), peer influence (Gardner & Steinberg, 2005), age (Harbaugh et al., 2002), and gender and competitiveness (Cárdenas, Dreber, Von Essen & Ranehill, 2012). Traditionally, the question of whether adult men and women behave differently in economic setting has to a great degree shown that women are more risk averse than men (see Charness & Gneezy, 2012; Gong & Yang, 2012; Croson & Gneezy, 2009; Powell & Ansic, 1997). Differences in gender among young children's economic behavior is an area of significantly less research, rendering somewhat mixed results. Therefore, gender difference in risk preferences among children will also be an area of interest in this study

The present study will aim to observe children's risk preferences through a controlled experiment conducted in Stockholm, Sweden. In this paper, participants are children in grades 3-5, aged 8-12 who all live in the inner city area. The experiment was designed to test children's risk preferences in three tasks, and to see whether or not the children's propensity for risk-taking correlated to the language skills of the child, controlling for other variables such as gender and age already extensively studied in the literature. The present thesis is organized as follows: section 2 will review the literature on the topic of interest, section 3 presents the experimental design and methodology, whilst section 4 will present the results.

2. Background

2.1. Literary review

"Less attention is given to children's economic agency in part because it is not widely understood as of when children possess the capabilities to acquire economic knowledge or to produce economic behaviors" (Freidline, 2015, p. 42). Harbaugh et al. (2002) find risk-taking in children "intrinsically important" to study (p.53), as it allows for models and policies to be shaped around them and their economic behavior. Children of the millennial generation influence their families' consumption to greater extent than their predecessors did and decisions about brands, products and searching for knowledge are being made as early as age 2 (Flurry, 2007). Shim et al. (2011) emphasize the importance of children and adolescents' consumption patterns, since these shape and influence their values and attitudes, ultimately contributing to their path toward adulthood. Harbaugh et

al. (2002) reiterate this view, meaning that if research is able to show how risk-taking behavior changes with age, insight will be gained into adult behavior as well.

Consumer socialization theorizes the transition and change in behavior of children into economic agents. Ward, in Shim et al. (2011) introduced the theory as "the process by which young people acquire skills, knowledge, and attitudes relevant to their effective functioning as consumers in the marketplace" (p. 291). Parents are found to be the most important consumer socialization agents, teaching their children how to behave in different contexts. However, recent research has found that children nowadays affect their parents' consumption decisions to a great extent, having as much as an 80% influence on food purchases (Flurry, 2007). Peers are also significant in shaping consumption patterns and behaviors through trends and peer pressure. Gardner and Steinberg (2005) support this by finding that risk-taking, while decreasing with age, increases when individuals are with their peers. Harrison, Lau and Rutström (2007) likewise found that younger subjects, specifically students, were more risk seeking than older ones. Another key influencer is the media and technology. As branding grows stronger, and children and adolescents become more materialistic, consumption has become more important and accessible than ever thanks to the Internet. Their search for knowledge and speed at which they acquire it (for example being able to multitask conversing, instant-messaging, downloading music and purchasing goods and services) show that the demographics' purchasing power is strong, estimated at around 600 million USD (Shim et al., 2011).

Understanding children as economic agents is also of importance for policy design. In the US, some local governments are introducing free college-savings accounts[3]. In Sweden, around 56% of families regularly give a weekly or monthly allowance to their children, averaging at 349 SEK per child. Children aged 6-8 collect their allowance in cash to a degree of 93%, and the same figure for 12-14 year-olds lies at 38% (Persson, 2015). This means that children receive a form of income at an early age, and experience a development of having to understand money in literal and figurative sense as they grow

[3] In Friedline (2015); the Kindergarten to College programe (K2C) introduced by the San Francisco School District and Child Development Accounts (CDAs) opened by the Saving, Education, Entrepreneurship and Downpayment national demonstration (SEED). Also, the state of Maine became the first in the country to open 529 college savings accounts with a $500 initial deposit for newborns at birth (p. 39)

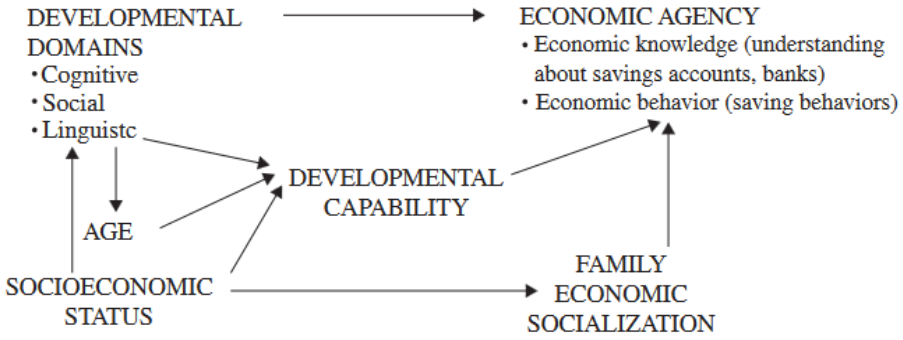
older. Research in this field can allow banks and governments to enable and understand this transition (and the subsequent progression from adolescent economic behavior to adult) and make information better and more accessible to parents and children.

More specifically, this study will investigate how languages affect economic behavior. As previously mentioned, children's developmental advances have been shown to reflect gains in economic knowledge (Friedline, 2015). Research has also shown that children of bilingual language skills have greater cognitive skills than monolinguals (Al-Amri, 2013). There is evidence for bilingual children being better at concept formation, meaning that they "can do so because they are exposed to a more complex environment (by virtue of their two languages) compared to monolingual children acquiring only one language" (p.4). Al-Amri (2013) also finds that bilingual children exceed monolinguals in both verbal and non-verbal tests and that bilingual children gain "certain cognitive advantages over their monolingual peers" (p.4). In particular, bilingual children performed better in tasks that required "cognitive flexibility" (p.4) and "executive function"[4] (Bialystok, 2007, p. 212). Friedman (2015) explains how children with developed cognitive flexibility are capable of focusing on the multidimensionality of objects, i.e. able to switch back and forth between several dimensions of an object. This is needed to understand the concept of money and, consequentially, gains and losses. For example, children who do not possess the adequate cognitive skills may consider "depositing money as synonymous with losing it" (p. 46).

Likewise, Ballinger, Hudson, Korkaviata and Wilcox (2011) write that cognitive abilities explain "variation in well-known risk and time preference phenomena associated with simple binary choices between lotteries and dated payments" (p. 351). Also, children's developmental gains in cognitive, social and numerical skills are of importance when understanding their role as consumers, savers and investors in financial markets. The capabilities of children affect (and similarly are affected by) relationships between family, gains in developmental skills, socioeconomic status, and so on. **Figure 1** in Friedman (2015, p. 55) illustrates this framework:

[4] Components of the executive function are attention, inhibition, monitoring and switching between languages (Bialystok, 2007, p. 212).

Figure 1 *A Framework of the Hypothesized Relationships between Child Development and Economic Agency*



The main relationship in focus in this study thus is the one between economic behavior and linguistic skills in children. Knowledge in numeracy (verbally counting and understanding numbers), hypothetical speech (the use of quantification words[5]) and use of tense (the use of past, present and future verb tense) are all part of their linguistic development that renders them able to become economic agents. Not only linguistic skills are required, of course, as cognitive and social skills enable children to obtain knowledge and experience which will affect their decisions and attitudes in financial situations.

The two theories supporting the link between language and behavior are the Sapir-Whorf hypothesis and the linguistics-savings hypothesis. The Sapir-Whorf hypothesis, or Whorfianism, states that language affects people's cognition and behavior, namely that the way we speak and the language we know iterates itself in the manner in which we see things and make choices. In Kay and Kempton (1984), Brown summarizes the hypothesis as such:

i. "Structural differences between language systems will, in general, be paralleled by nonlinguistic cognitive differences, /…/ in the native speakers of the two languages.
ii. The structure of anyone's native language strongly influences or fully determines the world view he will acquire as he learns the language" (p. 66).

The linguistics-savings hypothesis put forward by Chen (2013) states that "that being required to speak in a distinct way about future events leads speakers to take fewer future-oriented actions" (p. 690), generally meaning that the grammatical structure of a language

[5] Quantification words refers to words such as: "some", "almost", "nearly", "half" etc.

may affect the economic actions of its speaker. While the present paper does not focus on the syntactic structure of language, it does aim to understand the effect language can have on behavior.

It is also important to remember that several studies have evidenced that gender affects economic behavior. Seguino and Floro (2003) write that differences between men and women's economic behavior are generated by financial and cultural factors. "The implication is that women's lower levels of income also result in fewer resources available for savings and investment and may suggest a greater aversion for absolute risk." (p. 152). Among others, Charness and Gneezy (2012) observed differences in economic behavior between genders in adults, finding that women to a large extent, were significantly more risk averse than men. Gong and Yang (2011) similarly found that women tended to be more risk averse, regardless if the society they lived in was matriarchal or patriarchal. Irrespective of contexts, such as "familiarity and framing, costs or ambiguity" (p. 605), Powell and Ansic (1997) also found women to be more risk averse. Conversely, Booth and Nolen (2012), having studied children, found that gender effects were sensitive to the elicitation method of risk-taking propensity and the peer setting in which the experiments took place. Harrison et al. (2007) and Harbaugh et al. (2002), on the other hand, failed to find any significant gender difference among their observations. At the same time, Cárdenas (2012) found support for the claim that boys were more risk seeking than girls in their study of children in Colombia and Sweden. The varying results about gender differences among children requires more studies on risk preferences at an earlier developmental, educational and social stage.

2.2. Economic theory

"Risk and uncertainty play a role in almost every important economic decision" (Dohmen, Falk, Huffman, Sunce, Schupp & Wagner, 2011, p. 522) and to better understand how, an introduction to the underlying economic theory will be presented.

Quantified uncertainty is often regarded as risk, i.e. when outcomes can be measured as probabilities. As previously mentioned, risk occurs when some of these outcomes may be undesirable, namely when the expected value of one option is less than another. Economic theory generally dictates that rational economic agents are expected utility maximizers (Harbaugh et al., 2002) which means maximizing the probability weighted average of the

utility from each possible outcome and can be extended to show "how people's taste for risk affects their choice among options (investments, career choices, consumption bundles)" (Perloff, 2010, p. 603). Expected utility theory is used to analyze how decisions are made under such uncertainty about which state will occur. When considering individuals' behavior with respect to different options, which vary in expected value, we can classify individuals into three different classes:

- Risk averse: Such a person chooses the less-risky choice, if two choices have the same expected value. A risk averse person would choose a riskier option only if it has a sufficiently higher expected value.
- Risk neutral: this person picks the option with the highest expected value because maximizing expected value maximizes utility. This person chooses the riskier option if it even has a slightly higher expected value than the less risky option.
- Risk seeking: a person who prefers risk is willing to choose a riskier option, even if the expected value is the same, since they obtain a higher utility from the risky option.

When observing individual behavior, several deviations from the expected utility maximization theory are observed (see Dohmen et al., 2011; Gardner & Steinberg, 2005; Harrison, et al., 2007 and Powell & Ansic, 1999). This suggests that more research is needed to explain behavior that is inconsistent with expected utility theory.

Some biases affect the way in which individuals formulate beliefs about future events. The gambler's fallacy is a bias in which the individuals are affected by past events in formulating beliefs about future events when, in fact, the events are unrelated. An example of this fallacy is represented by the belief that there exist "late numbers" in lotteries or multiple coin tosses. Each coin toss event is independent from the next, and yet, individuals affected by the gambler's fallacy may think that after getting two heads in a row, a tail is more probable since it is "due". This is something frequently observed in children, particularly before having studied probability in school. Another example of wrong beliefs formation may be due to people's choice varying with circumstance, for example low-probability gambles such as lottery tickets. Some people do not realize that the cost of the lottery ticket normally exceeds the expected value of winning, thereby not maximizing their utility.

A crucial factor affecting risk choices is framing, which is the basis of prospect theory. This theory is used "to account for the fact that most people seem to prefer a risky option over a sure thing when the choices are framed in a positive way /…/ but they shift their preferences when the same choices are framed in a negative way" (Byrnes et al. 1999, p. 369). Kahneman and Tversky (1981) famously posed a problem to students, whereby a hypothetical disease would be introduced to the country and as a result, 600 people were expected to die. When given the choice between program A (200 people would be saved) and program B (1/3 probability that 600 people will be saved and 2/3 probability that no one will be saved), 72% of students opted for program A. Another group of students was asked to choose from the same programs – though this time, the outcomes were framed differently. The choice between program C (400 people will die) and program D (1/3 probability that no one will die, 2/3 probability that 600 people die) resulted in 78% choosing program D which held larger, but uncertain losses, than C which held certain losses. This pattern is called the reflection effect, which implies the reversal of risk attitudes for gains and losses. In prospect theory, people are concerned about gains and losses in wealth, i.e. the change, rather than the level of wealth (as used in expected utility theory).

2.3. Aim and Research Question

The present study aims to investigate the correlation between risk preferences in children and their linguistic abilities, controlling for variables such as gender and age.

The research questions are:

1. What differences in risk attitudes between monolingual children and bilingual children can be observed?
    i. Do the languages the participants speak affect their propensity of taking risks, i.e. is there a difference between monolingual speakers of strong future tense languages versus weak future tense?
2. What other variables affect risk attitudes among children? How do these variables interact with the linguistic abilities?
    i. Do differences occur between boys and girls?
    ii. Do differences occur between genders given monolingualsim/ bilingualism?
    iii. Does risk preference change with age?

To answer these questions an experiment that uses three simple instances of risk-taking was conducted, and thereafter the study was supplemented by a parental survey.

3. Methodology

3.1. Setting

The study was conducted in two elementary schools in the inner city of Stockholm in April 2015. The schools were selected partially out of convenience and partially for their location and demographic likenesses. Both schools are inner-city schools, located in areas of similar mean income. School 1 is located in the region of Norrmalm, in a district where the mean annual income lies at 437.000 SEK[6]. It is an international school, using English as its medium of instruction and profiling itself towards children of an international background as well as Swedish children interested in an international education. The school is comprised of around 570 students from 64 international backgrounds, ranging from Kindergarten to Grade 12. The main building (where the experiments were conducted) houses the preschool classes (ages 3-5) and grades 1-10 (ages 6-15). School 2 is located in Hammarby Sjöstad, in a district with a mean annual income of 420.900 SEK[7]. Swedish is the medium of instruction at School 2, as it is a municipal elementary school for children from preschool to Grade 9. Around 750 students attend the school, however the number of international backgrounds is not known. The school houses preschool classes (ages 6) and grades 1-9 (ages 7-15).

The experiments were conducted in either a quiet corner of the library or an empty classroom after school hours, which was usually after 15.30 Monday-Friday. On two occasions the experiments were conducted during a lunch break or a recess, to accommodate scheduling conflicts. It was important to have a quiet area, without the presence of other children or adults, as this could have an effect on the child's choices or mental state (feeling nervous, unsure, shy etc.).

[6] As of 2013, figures from http://www.statistikomstockholm.se/index.php/omradesfaktax for the district Södra Johannes. The mean annual income for inner-city Stockholm is 388.700 SEK, and for the whole city 332.00 SEK.

[7] As of 2013, figures from http://www.statistikomstockholm.se/index.php/omradesfaktax for the district Södra Hammarbyhamnen.

3.2. Participants

The grades 3-5 were targeted, as the children in those grades composed of 8-12-year-olds, and those ages in turn correspond to children's ages used in previous research (see Legetporer et al., 2014a; Legetporer et al. 2014b; Cárdenas et al., 2012 and Harbaugh et al., 2002, who used children in the age spans 6-11, 7-11, 9-12 and 5-13 respectively). Friedman's (2015) analysis of children's cognitive, social and linguistic developmental capabilities is also taken into consideration here, as the author identifies the 8-9 and 11-12 year spans as significant age domains. At the age of 8 or 9, children will have gained several skills, among others the ability to think abstractly, use information and strategies, become aware of people's differing opinions, recognize that ownership is not always based in possession, develop identities associated with objects, use past, present and future tense correctly and accurately distinguish the time order of events. At ages 11 or 12 they are able to carry out more complex behaviors, spontaneously use strategies, are able to maintain and manipulate information, simultaneously consider their own and other's points of view and develop skills in negotiation and persuasion (Friedman, 2015, p. 47).

Consent forms that gathered fundamental information (such as age, gender and languages spoken) were sent out to the students after having first conferred with the respective schools principals and a personal introduction had been made to the children in their classrooms. After collecting the consent forms, a sample of 40 children was chosen for the experiments. 20 children were chosen from School 1, and 20 from School 2. An equal number of boys and girls were chosen, and likewise bilinguals and monolinguals[8]. The children were given number identifiers in order to keep them anonymous. The numbers were chosen at random, picked out of a bag of numbers between 1 and 40.

The definitions of bilingual and monolingual came from the parents in the consent form (seen in Appendix A). As parents know their child best, and speak with them in their home setting, they were the most reliable sources on what languages the child spoke fluently. In some cases, the parents had written three (or more) languages on the consent form, but when the child was asked the same question (in the post-experiment questionnaire, seen in Appendix C), they only replied that they spoke two of those

[8] A closer look at the distribution can be found in section 4.1.

languages fluently (or that they spoke language X "but only in school/ not very well/ only a little"). In those cases, the child's answer was more appropriate, and that information was eventually fed into the data. In regards to s-FTR and w-FTR languages, only monolinguals were chosen, as to more easily define the strength/ weakness of the future time reference.

3.3. Experimental design

In particular, experiments as a method were used to circumvent the pitfalls of using surveys, a common means of investigating risk attitude. Dohmen et al. (2011) write that experimental studies "offer an incentive-compatible measure of risk attitudes" (p. 523), something that survey studies do not do, due to the fact that the traits and attitudes are self-reported. Charness et al. (2013) primarily discuss two means of using experimental methods to uncover risk preferences. The method developed by Gneezy and Potters (1997) involves letting a decision maker receive $\$X$, and then asking her/him to invest a part of it, \$x, in a risky option, with the return $\$kx$ ($k > 1$) with the probability p, or $\$x$ is lost with the probability $1– p$. In this paper, a variation on this approach was made to make it easier for children to understand. This involved letting a participant choose a "safe"[9] option of 1 sticker or a "risky" option, choosing a dice from a bag (in the bag was a white and a black dice). If the dice was white, the participant would receive 2 stickers, and if the dice was black, they would receive 0. The participant chooses a dice at the probability of 0.5 for both outcomes, rendering an expected utility of 1 if choosing either the "safe" or the "risky" option. However, we know that a risk averse child will choose to "stay", whereas a risk seeking child will choose the bag. Having the same expected utility for both options allows for individual parameters of risk preference to be measured.

This first task (task 1) was mainly used to introduce the children to the concept, running through the instructions, checking for understanding, choosing dice in the correct manner etc., which is why this task is regarded as the controlled task in the remainder of the paper. This is also the reasoning behind constructing three tasks. One was needed to introduce the children to the experiment, and two more were used to elicit risk-taking behaviors. No more than three tasks were chosen due to time constraints, (in fact, the children took

[9] The wordings "safe" and "risky" were not used in the experiments (see Appendix B for scripts), but will be used in the remainder of the paper for clarity.

part in the experiments after school and thus could not be held for long). Also, to enable sessions with several participants per day, three tasks took up just enough time to get results, ask questions and hand out prizes. In the script, the explanations for all three tasks involved asking the child to repeat the instructions, to check for understanding. This was accomplished by all children, resulting in an intact sample.

Task 2 consisted of a choice between a "safe" option of 2 stickers, and a "risky" option where the participant could get 3 stickers for a white dice or 1 sticker for a black dice. Expected utility for both staying and taking the risk is 2, meaning that once again, the individual's risk preference is being studied. This task was also designed to allow for a guaranteed "win" i.e. increasing the participant's sticker-collection by 1. For each sticker won, the participant would be able to exchange the sticker for a prize.

Task 3 was designed to allow for risk seekers to show themselves. The "safe" option was 3 stickers, and the "risky" option was 10 stickers for a white dice, and 0 for a black dice. In this case, the expected utility of staying was 3, and taking the risk 5. Thus, risk averse participants should choose to stay, and risk neutral and risk seekers choose the riskier option as its expected utility is higher.

To control for the order of the second and third task (as mentioned, the first task would always be first so as to introduce the experiment to the participant and explain the rules), the third task was given after the first in the case that the child's number identifier was odd, and the second task was given after the first if the child's number identifier was even. Prizes were handed out after the experiment had been completed, consisting of an array of different colored stickers, balloons, paper ribbons, rubber bands and paper clips. This was explained to the children in the beginning of the tasks. Also, having a guaranteed sticker (such as the outcome in task 2) would let even a child who only gets black dice in all three tasks to receive a prize at the end of the experiments, making for a happier experience than receiving no stickers (and therefore) prizes at all.

3.3.1. Hypotheses

The main hypothesis is that since previous research has shown that bilingual children exhibit greater cognitive skills than monolingual children, they will be more wary of potential risks, more developmentally mature, able to think abstractly and with cognitive flexibility, leading them to more carefully consider their options.

H_0 = Bilinguals will be more risk averse than monolinguals.

Languages that are strong in future tense, such as English, tend to render their speakers with lower savings rates. While previous studies have not measured FTR levels with risk-taking, the hypothesis here is that since s-FTR speakers consider the present more valuable than the future, speakers of these languages will be more risk seeking.

H_1 = Speakers of w-FTR languages will be more risk averse than speakers of s-FTR languages.

In regards to gender, previous research has shown that girls are more risk averse than boys, and that this is a trend that carries on throughout age, context and gender roles.

H_2 = Girls will be more risk averse than boys.

Finally, as research has shown that risk aversion increases with age, the hypothesis regarding this variable states that:

H_3= Older children will be more risk averse than younger children.

3.3.2. Data

After the experiments, the results were coded in to an Excel-file that was used to form the data frame used in the statistical software R for analysis[10]. The variables used in the data frame are listed in **Table 1**, as follows:

Table 1. Variables.

child_id	The child identification number. If the number was odd, the tasks were given to the child in the order Task 3 – Task 2, and vice versa for even numbers.
bilingual	Monolingual or bi-/multilingual. In all data analysis, the term bilingual replaces bi-/ multilingual. Bilingual = 1, monolingual =0
girl	Female or male participant, girl = 1, boy = 0
age	Age, in years
school1	If the child belongs to the international school or the Swedish school. If the international school, school1 =1, Swedish school, school1 =0.
order32	If the order of the task was Task3-Task2, order32 =1, if the order was Task2-Task3, order32=0.
bilingualage	Interaction term bilingual x age
oldchild	A child aged >9 is regarded as an old child.
sFTR[11]	If the language spoken was has strong future time references, sFTR=1, if it was a language with weak future time references, sFTR=0.
risk1/2/3	Whether or not the child took a risk in task 1/ 2/ 3. Risk =1, no risk = 0
riskall	Those who took risks in all three tasks, riskall = 1, riskall =0 for those who chose to receive stickers straight away at least once.
outcome 1/2/3	The outcome (i.e. number of stickers) won by the child in each respective task.
outcomesecond	The outcome of the second task, regardless if it was task 2 or task 3.
secondtask	Whether the child took a risk in the second task, regardless if it was Task 2 or Task 3.
lasttask	Whether the child took a risk in the last task, lasttask = 1, or not, lasttask =0.
date	Date and time of experiment
languages	The child's spoken languages, as reported by themselves during the experiment.
grade	The grade (class) of the child.

[10] The raw data can be found in Appendix F.

[11] The classifications of strong vs weak FTR languages in this paper follows Chen's categorizations in https://www.ldc.upenn.edu/sites/www.ldc.upenn.edu/files/chen.pdf.

3.4. Questionnaire

A questionnaire was sent out via e-mail to the parents of the participants after the experiments to acquire more demographic and behavioral information. Here, questions regarding the parents' backgrounds were asked, such as place of birth and level of education. The questionnaire also asked or their perception of their children's attitudes, extracurricular activities, if the child receives pocket money etc. The full questionnaire is available in Appendix D. The variables added to the data frame for respondents of the questionnaire are reported in **Table 2**:

Table 2. Variables gathered from the questionnaire.

allowance	Monthly allowance per child in SEK. If e.g. 100-300 was reported, an average of 200 was used.
parentsforeign	If either the parent answering the questionnaire was born outside of Sweden, parentforeign =1 was used, parentforeign = 0 if not.
parenteducation	Parenteducation was used for the parent answering the questionnaire, where 1 = elementary school, 2 = high school, 3 = undergraduate, 4 = postgraduate.
householdsize	Number of family members living together in the same house.
extraactivity	If the child participates in an extra-curricular activity, extraactivity =1, if not, extraactivity = 0.
caretaker	Who the main caretaker of the child is after school. Parent = 1, grandparent = 2, other relative = 3, babysitter = 4, other = 5.
dominant/ playful/ assertive/ confident/ adultinteract	Here, the parents rated their child on a scale of absolutely = 4, quite a lot = 3, hardly = 2, not at all = 1, do not wish to say = 0.
talksalot/ blurts/ distracted/ cantwait/ interrupts	Here, the parents rated their child on a scale of never or rarely = 4, sometimes = 3, often = 2, very often = 1, do not wish to say = 0.

4. Results

4.1. Descriptive data

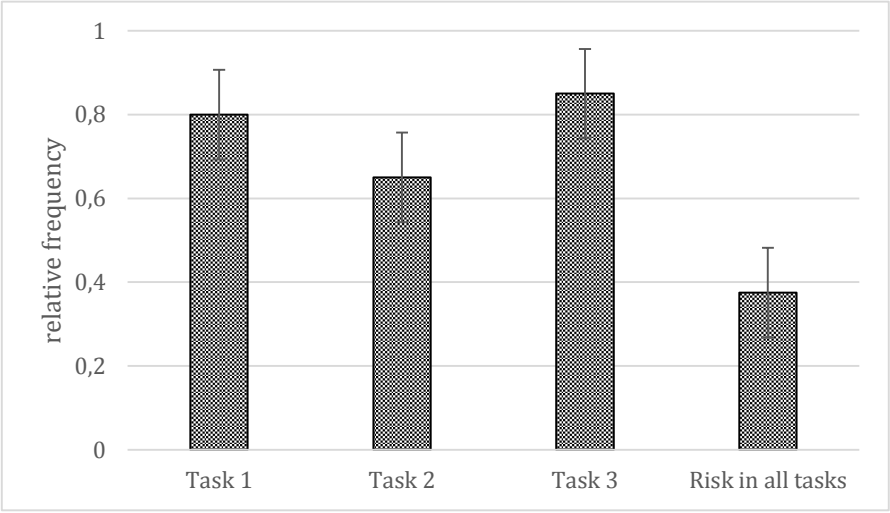
The distribution between girls/ boys and monolinguals/ bilinguals is reported in **Table 3** according to age, which spanned from a minimum of 8 years to a maximum of 12. The mean age is 9.675 years, with the median at 9.5 and at a standard deviation of 1.163. The mean age for girls is 9.9 years and for boys 9.45 years. The distribution shows that there are an equal number of observations for each category, i.e. 20 monolinguals, 20 bilinguals and 20 girls, 20 boys. There is, however, some lacking data, in the form of 12-year-old bilinguals and 11-year-old monolingual boys.

Table 3. Number of participants by age, gender and language skills.

	Monolingual		Bilingual	
Age (in years)	Girls	Boys	Girls	Boys
8 years	1	2	2	1
9 years	2	6	3	3
10 years	3	1	2	4
11 years	2	-	3	2
12 years	2	1	-	-
Total (N=40)	**10**	**10**	**10**	**10**

In the first task, the 85% of the participants were inclined to take the risk. The second task experienced a decrease in risk taken, to a relative frequency of 62.5%. In task 3, the relative frequency of risk taking rose again, to 80%. Overall, 37.5% of the participants chose the "risky" option for all tasks. **Figure 2** illustrates the relative frequency of risk taken by task, showing this pattern with one standard error.

Figure 2



4.1.1. Monolinguals/ Bilinguals

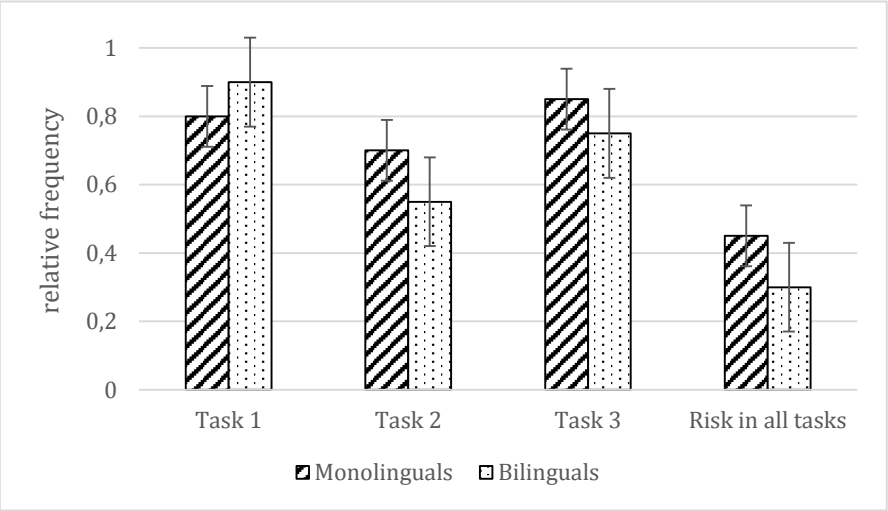
Table 4 shows the relative frequency of risk-takers numerically, as well as the distribution between monolinguals and bilinguals.

Table 4. Frequency (and relative frequency) of risk-taking by language skills.

	Risk taken		
	Monolingual	Bilingual	**Total**
Task 1	16 (80%)	18 (90%)	**34 (85%)**
Task 2	14 (70%)	11 (55%)	**25 (62.5%)**
Task 3	17 (85%)	15 (75%)	**32 (80%)**
Risk in all tasks	9 (45%)	6 (30%)	**15 (37.5%)**

From the data gathered, it can be seen that, in general, the participants were more risk seeking during task 1 and task 3, and slightly less in task 2. Bilinguals were more frequently risk seeking in the first task, but monolinguals were more risk seeking in task 2 and task 3. Monolinguals also comprised the majority of those who chose the "risky" option in all tasks. **Figure 3** illustrates the distributions between monolinguals and bilinguals, separated by task[12]. The striped bars represent monolingual frequencies and the dotted bars represent bilingual frequencies. So far, it seems that monolinguals are more likely to be risk seekers than bilinguals, the exception being in task 1.

Figure 3



[12] Results controlling for order effects, i.e. for the first, second and third tasks, can be found in Appendix G.

4.1.2. Boys/ Girls

Observing the risk choices of boy/ girl participants, the frequencies show that their behavior mirrors that of monolinguals/ bilinguals very closely. In the first task, 80% of boys chose the "risky" option, and so did 90% of girls. The same distribution was seen amongst monolinguals/ bilinguals in task 1. In task 2 and task 3, however, boys were more prone to taking risks than girls (75% versus 50%, and 85% versus 75% respectively), though task 2 did see a decrease in risk-taking. 50% of boys took a risk in all tasks, while the corresponding relative frequency was 25% for girls.

Table 5. Frequency (and relative frequency) of risk-taking by gender.

	Risk taken		
	Boys	Girls	**Total**
Task 1	16 (80%)	18 (90%)	**34 (85%)**
Task 2	15 (75%)	10 (50%)	**25 (62.5%)**
Task 3	17 (85%)	15 (75%)	**32 (80%)**
Risk in all tasks	10 (50%)	5 (25%)	**15 (37.5%)**

Through the data in **Table 5** and **Figure 4** it can be seen that girls in the first task were slightly more often risk seeking, but in the remainder of the tasks, girls remained more risk averse. This is in line with the hypothesis, which stated that boys would be more risk seeking than girls.

Figure 4

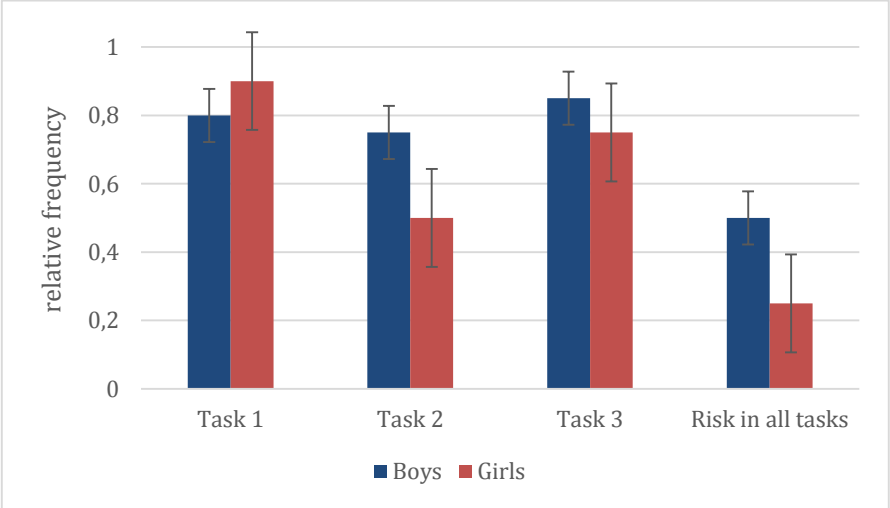


Figure 5.1 shows the distribution between monolingual girls and boys. In this case, boys were once again more risk seeking than girls, except in task 1 where they were equally likely to choose the "risky" option. Among bilinguals, however, the trend is not as clear. While bilingual boys took risks more often than girls in tasks 2 and 3, their propensity for

taking a risk in all tasks was the same for both genders, and girls were more risk seeking than boys in task 1. This is illustrated in **Figure 5.2**

Figure 5.1

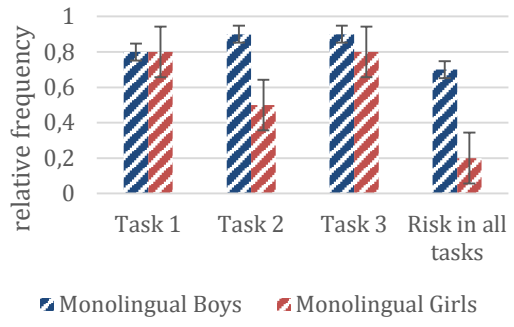
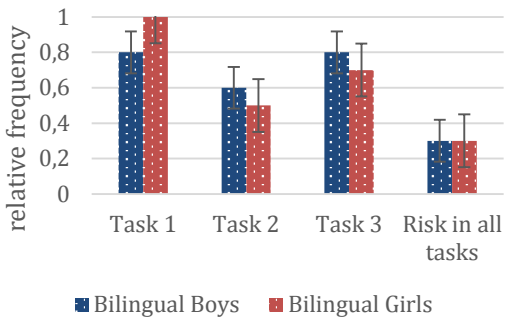


Figure 5.2



Differences can also be seen when observing language skills among gender groups. In **Figure 6.1** monolingual boys choose the "risky" option more frequently than do bilingual boys. Monolingual girls, however, as seen in **Figure 6.2** were more risk averse than bilingual girls in task 1, but equally risk prone in task 2 and more risk seeking in task 3. For all tasks, however, bilingual girls showed a greater relative frequency.

Figure 6.1

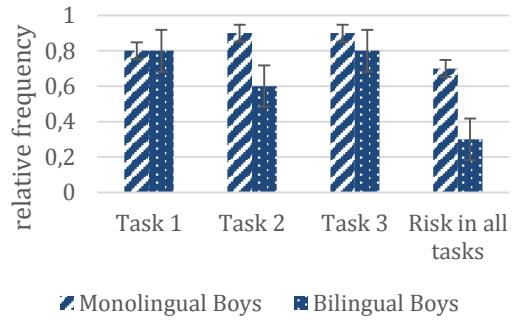
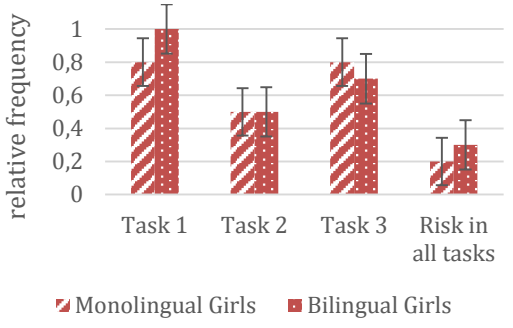


Figure 6.2



4.1.3. s-FTR/ w-FTR

The following data was gathered for monolingual speakers of s-FTR and w-FTR languages. Since these observations were only done on monolingual speakers, the sample consists of 20 participants. w-FTR languages comprise the majority of these speakers, with 9 out of 16 participants being boys. This is in contrast to s-FTR languages, where girls are dominant: 3 girls to 1 boy. **Table 6** shows the distribution between languages and language types.

Table 6. Number of monolingual participants by gender and language type.

	s-FTR		w-FTR	
	Girls	Boys	Girls	Boys
English	2	-	-	-
Portuguese	1	-	-	-
Korean	-	1	-	-
Swedish	-	-	6	7
Japanese	-	-	1	2
Total (N=20)	3	1	7	9

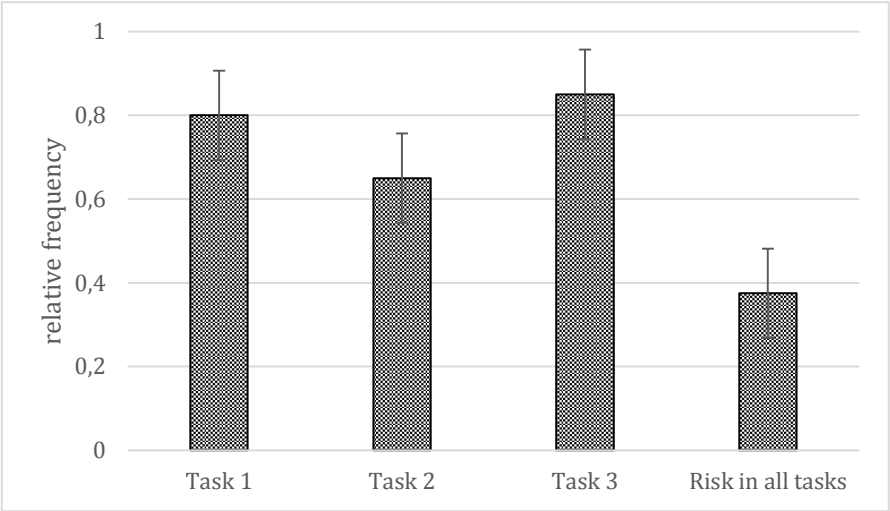
The languages spoken include Korean, Portuguese, English (languages with s-FTR), Japanese and Swedish (languages with w-FTR). In **Table 7**, it can be gathered that speakers of strong future time reference languages tend to take risks to a greater extent than speakers of weak future time reference languages.

Table 7. Frequency (and relative frequency) of risk-taking by language type.

	Risk taken		
	s-FTR	w-FTR	**Total**
Task 1	4 (100%)	12 (75%)	**16 (80%)**
Task 2	3 (75%)	10 (62.5%)	**13 (65%)**
Task 3	4 (100%)	13 (81.25%)	**17 (85%)**
Risk in all tasks	3 (75%)	6 (37.5%)	**9 (45%)**

Figure 7 illustrates the relative frequencies of risk taken amongst s-FTR (N=4) and w-FTR speakers (N=16). It is worth noting that the distribution between s-FTR and w-FTR languages was not equal, which may account for some bias in the results.

Figure 7



In general, the pattern seems to follow the one already established, namely that participants were likely to take a risk in general, but slightly less so in task 2. Overall, 45% of the participants chose to take a risk in all tasks, which is slightly higher than for the entire sample of 40 participants, where the relative frequency was 37.5%. **Figure 8** shows the distribution between s-FTR speakers and w-FTR speakers. Here, s-FTR speakers more frequently take risks than w-FTR speakers in all tasks, even in task 1, which did not occur in the cases regarding monolingual/ bilingual participants and boys/ girls.

Figure 8

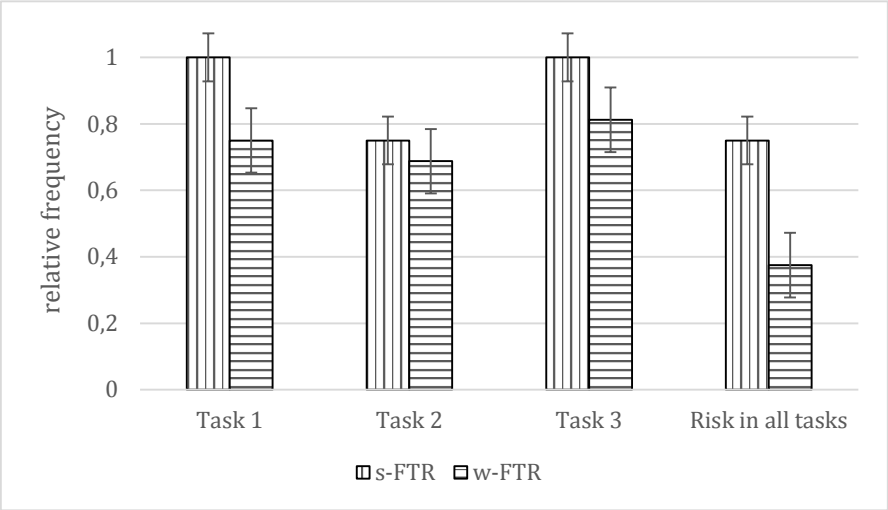


Figure 9.1-9.2 illustrates the distribution of risky choices between s-FTR and w-FTR speakers by gender. Both amongst s-FTR and w-FTR speakers, boys were the greater risk seekers.

Figure 9.1

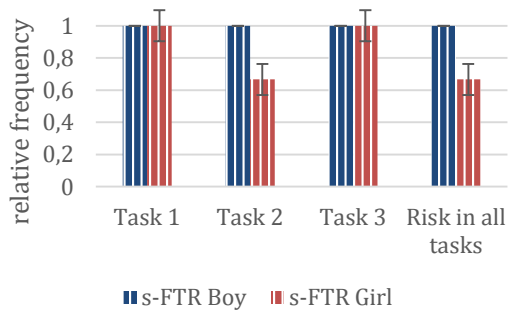
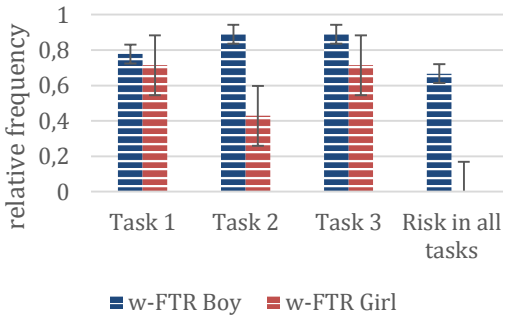


Figure 9.2



The same trend can be seen among boys and girls. s-FTR speakers were more often the greater risk-takers, as can be seen in **Figures 9.3-9.4.**

Figure 9.3

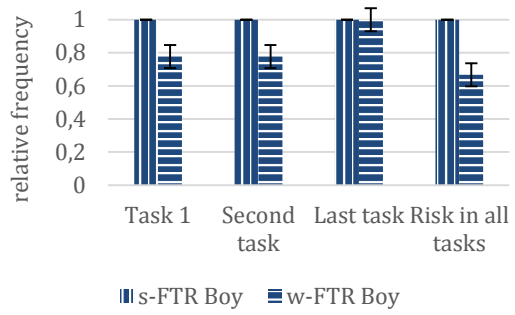


Figure 9.4

This is in accordance with the hypotheses that stated that boys were more likely to be risk seeking than girls and that s-FTR speakers would be greater risk seekers than w-FTR speakers. This also holds true for task 1, which was not the case in the previous data.

4.1.4. Age

To analyze risk-taking behavior in accordance to age, the whole sample was categorized into young children and old children (where old children were aged >9[13]). As a result, 20 children fell below the age limit and were regarded as young children, and the remaining 20 were regarded as old children. The distribution between young and old children's risk choices can be seen below in **Table 8**.

Table 8. Frequency (and relative frequency) of participants by age group.

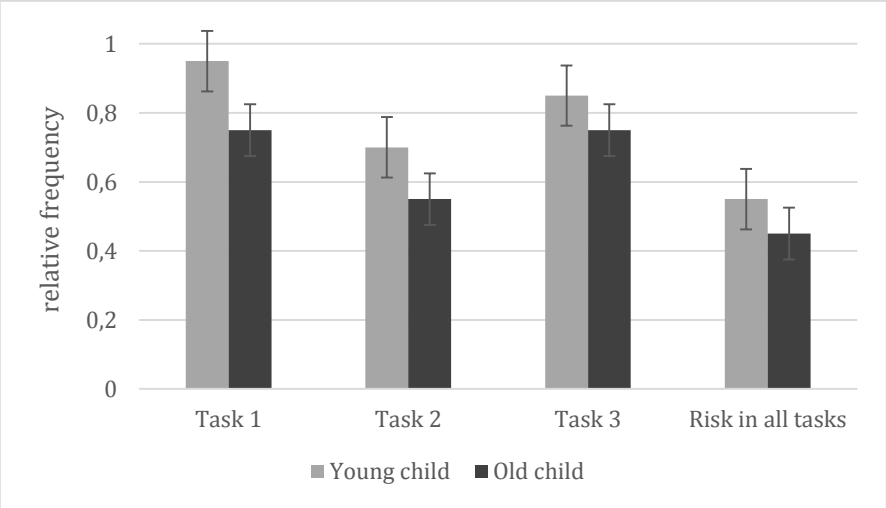
	Risk taken		
	Young	Old	**Total**
Task 1	19 (95%)	15 (75%)	**34 (85%)**
Task 2	14 (70%)	11 (55%)	**25 (62.5%)**
Task 3	17 (85%)	15(75%)	**32 (80%)**
Risk in all tasks	11 (55%)	4 (20%)	**15 (37,5%)**

[13] This is the same distinction made for "oldchild", one of the independent variables used in the regression analysis, see section 3.3.2.

The table shows that, throughout all tasks, younger children have a higher frequency of taking risks than older children, though the relative frequency was slightly lower in task 2, which corresponds with the data for monolinguals/ bilinguals and boys/ girls.

Figure 10 illustrates the relative frequencies. Here, the lighter bars show higher frequencies for risk-taking in younger children than older children, shown in the darker bars. This can be interpreted as age having a negative effect on risk-taking propensity, meaning that older children are less willing to take risks.

Figure 10



For a closer look, the charts in **Figures 11.1-11.4** show differences between age groups when controlling for language skills and gender. Here, younger monolingual boys and girls more often take risks than older monolinguals, which is in line with the hypothesis that older children are more risk averse than younger. However, older boys are the greater risk-takers amongst bilinguals, and older bilingual girls took more risks than younger bilinguals girls in task 2 and for all tasks, whereas younger bilingual girls only took more risks than older in task 2. The lighter shades of blue and red signify younger participants.

Figure 11.1

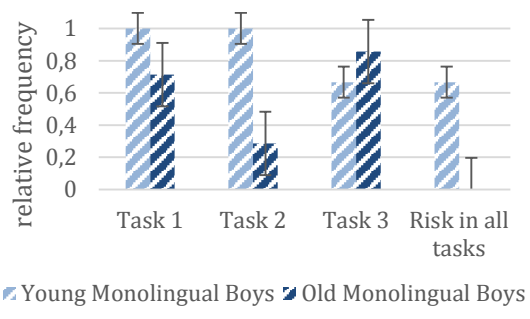


Figure 11.2

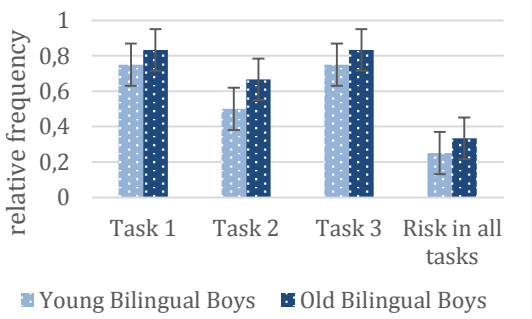


Figure 11.3

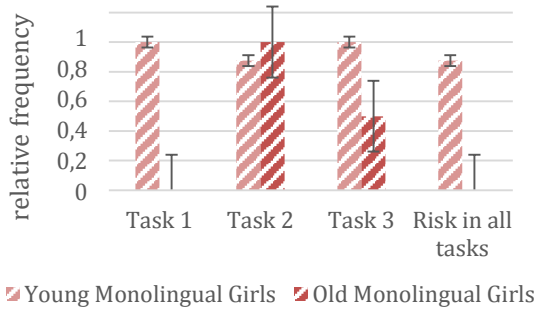
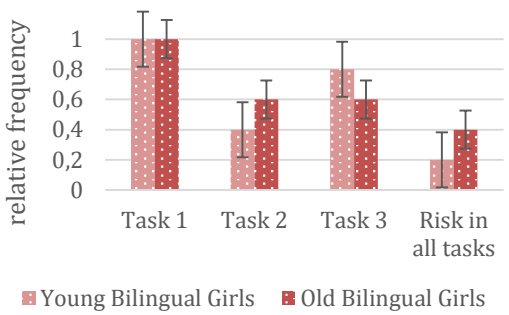


Figure 11.4



Older monolingual and bilinguals girls were more prone to choosing the "risky" option in task 2 than younger girls were. **Figures 12.1-12.4** are used to investigate whether or not this trend was present within age groups. Monolinguals were among both young boys and girls the greater risk seeking group. However, bilinguals were the more common risk-takers among older participants. There thus seems to be a discrepancy between monolinguals and bilinguals, even within the same age and gender groups.

Figure 12.1

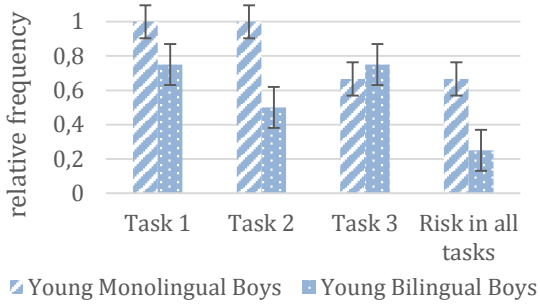


Figure 12.2

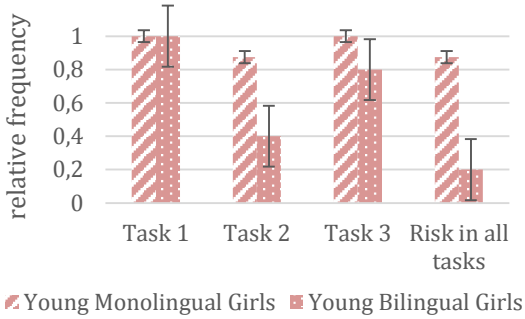


Figure 12.3

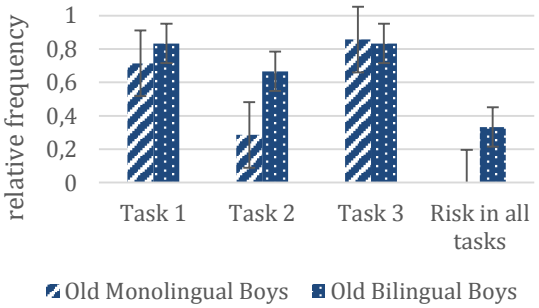
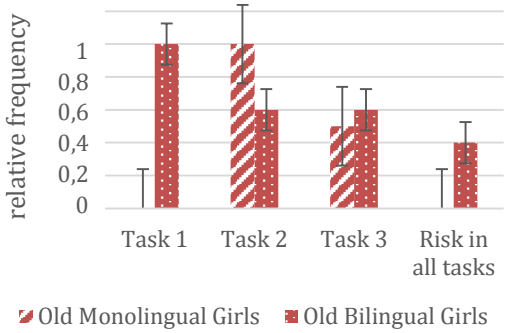


Figure 12.4



Figures 13.1-13.4 illustrate differences between gender within the same age and language skill groups. Here, the results are somewhat more unclear.

Figure 13.1

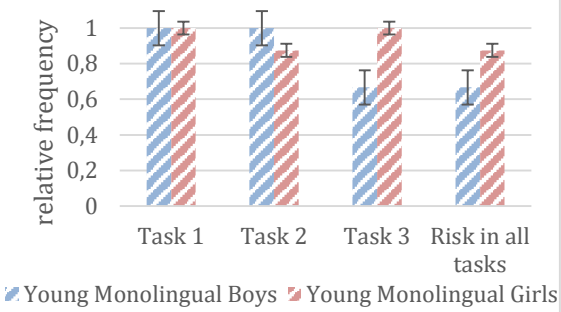


Figure 13.2

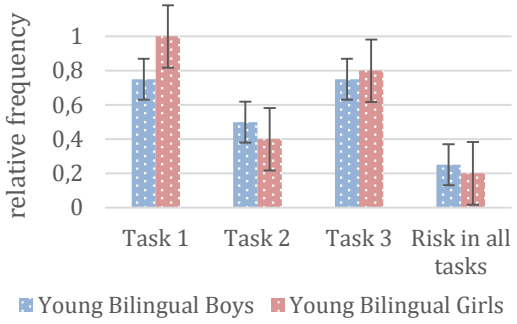


Figure 13.3

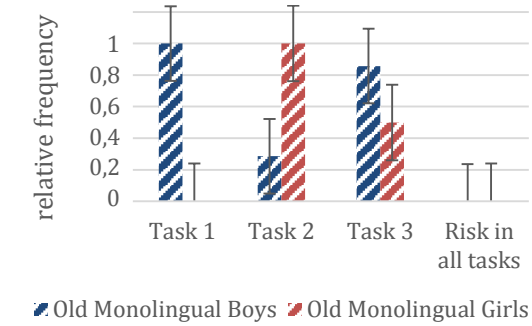
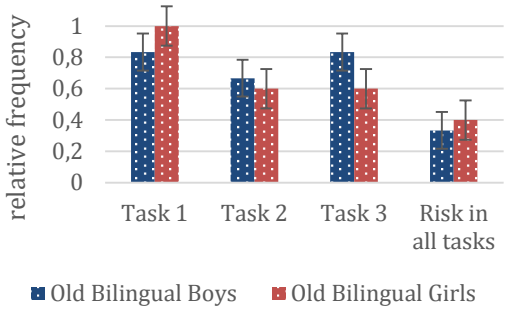


Figure 13.4



Younger participants, whilst more risk seeking than older, saw girls be the greater risk-takers in task 3, and boys the greater risk-takers in task 2. Task 1 saw monolinguals be equally risk prone and young bilingual girls more so than boys. Older monolinguals saw boys generally be the greater risk-takers, except in task 2 where girls were much more risk seeking than boys. Older bilinguals also exhibited varying results, wherein older bilingual girls showed a greater risk aversion in tasks 2 and 3, but more risk seeking behavior in tasks 1 and for taking a risk in all tasks.

In summation, relative frequencies of "risky" choices made in the three tasks and in all tasks showed that monolinguals were generally more risk seeking than bilinguals. Likewise, boys were generally more risk seeking than girls. Amongst monolingual speakers, participants who spoke s-FTR languages possessed greater risk propensities than w-FTR speakers, and younger children were more risk seeking than older. However, comparing within age, gender and language groups showed some discrepancies. Older bilingual boys were, for example, more risk prone than young bilingual boys.

4.2. Regression

In this section, results from a set of regressions are reported. Based on the analysis conducted in the previous section, the expected results are that for task 1, being bilingual should have a positive effect on the probability of taking a risk. The opposite is expected for tasks 2 and 3, i.e. the last tasks, as the descriptive data showed that monolinguals were more risk seeking than bilinguals. The same holds true for being a girl; it is also expected to have a positive effect in task 1 and a negative in the last tasks. Speakers of w-FTR languages and older participants, however, are expected to have negative effects throughout all the tasks, since their relative frequencies were lower, regardless of task number. Regressions were also run for taking risks throughout all tasks and for taking a risk in the last task, as displayed in **Table 9**.

All models are estimated using a probit regression. In models (1) and (2) the dependent variable is "Risk in Task 1", capturing the decision to take risk in task 1. In models (2) and (3) the dependent variables are "Risk in Task 2" and "Risk in Task 3", respectively, capturing the decision to take risk in task 2 and task 3. Model (5) uses as dependent variable "Risk in last task" capturing the decision to take risk in the last task encountered (which can be Task 2 or 3 depending on the order in which they are presented to the child). Finally, model (6) uses as dependent variable a dummy which takes value 1 if the child decided to take risk in all three tasks and 0 otherwise.

The independent variables included are: "bilingual" which takes value 1 if the child is bilingual and 0 otherwise; "girl" which takes value 1 for females and 0 otherwise; "age" that indicates the age of the child in years. In some models age is captured by the dummy "oldchild", which takes value 1 if the child is older than 9 and 0 otherwise. The dummy "school1" takes value 1 if the child was attending school 1 and 0 otherwise; the dummy "order32", which takes value 1 if the child is confronted with task 3 as second task and 0 otherwise. Interaction terms between the variable "age" and "bilingual" where included in models (2)-(6). In models (3)-(6) the variable "outcomesecond" is included; the outcome of the second task. This variable was included to account for the fact that winning or losing can affect the subsequent choice to take risk as well. In models (2)-(4) the variable "risk1" is included to account for the first choice taken by the child and in model (2) the variable "outcome1" was included to account for the outcome of the first task.

Table 9. Probit regression on risk-taking by tasks[14].

Model	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Dependent Variable	**Risk in Task 1**	**Risk in Task 1**	**Risk in Task 2**	**Risk in Task 3**	**Risk in Last Task**	**Risk in all 3 Tasks**
Independent Variables						
bilingual (=1)	0.467	-4.969	-9.756**	10.299	-15.939**	-7.509*
	(0.867)	(5.879)	(4.349)	(6.750)	(7.511)	(4.077)
girl (=1)	1.467*	1.150	-0.183	-1.635*	-0.142	-0.405
	(0.855)	(0.734)	(0.538)	(0.929)	(0.623)	(0.461)
age (in years)	-0.907**	-	-	0.221	-0.788*	-
	(0.371)			(0.682)	(0.455)	
school1	0.281	0.385	-0.085	3.507**	-0.964	-
	(0.808)	(0.710)	(0.682)	(1.583)	(0.861)	
order32	-	-	0.321	-0.972	1.272*	0.644
			(0.553)	(0.932)	(0.718)	(0.567)
bilingualage	-	0.559	1.051**	-1.381	1.565**	0.767*
		(0.611)	(0.469)	(0.963)	(0.757)	(0.427)
oldchild	-	-1.771**	-1.574**	1.933	-	-1.833**
		(0.847)	(0.775)	(1.398)		(0.723)
outcomesecond	-	-	-	0.333**	0.133	-0.091
				(0.160)	(0.121)	(0.079)
risk1	-	-	-6.595	1.574	-0.833	-
			(558.476)	(1.080)	(0.973)	
outcome1	-	-	0.534**	-	-	-
			(0.269)			
Constant	9.246***	1.224**	6.757	-3.448	9.311*	0.829
	(3.580)	(0.619)	(558.476)	(6.750)	(4.973)	(0.588)
Observations	40	40	40	40	40	40
McFadden R^2	0.353	0.247	0.371	0.385	0.340	0.225

Note. ***, **, * denote significance at the 1%, 5%, 10% level, robust standard errors in parentheses.

The variable "bilingual" produced significant effects in models (3), (5) and (6), all indicating a negative result. This could be interpreted to mean that being bilingual has a negative effect on risk-taking, i.e. that bilingual children are more risk averse than

[14] The average marginal effects, which describe the discrete change in probability for each of the independent value, can be found in Appendix H, **Table 12**.

monolingual children. Likewise, the variable "girl" presented a negative effect in several regressions, though only one was significant, model (4). This could indicate a negative relationship between risk-taking and being a girl, which is in accordance with prior research. The variable "oldchild" produced several significant results, all of which were also negative. Thus, being an older child also points to an aversion towards risk. So far, the regression results seem to correspond with the initial descriptive data and the hypotheses.

Other significant variables were "age", which indicated that the higher the age of the participant, the lower propensity of taking risk, "school1", which iterated itself in one regression as significant, showing that students at the international school were more probable to take risks than those at the Swedish school and "outcome1", meaning that if the participant had a positive outcome in the task 1, they were more likely to take a risk in task 2. The variable "order32" also seems to have had a positive effect, meaning that those who were given tasks in the order task 1 – task 3 – task 2 showed greater risk seeking behavior than those who were given task 1– task 2 – task 3.

As probit regressions models do not have the R^2 equivalent to OLS regressions, the measurement of goodness-of-fit was in this case McFadden's[15] pseudo R^2. All gave values between 0.2-0.4, which indicate high goodness-of-fit.

Given the small sample size, when it came to monolingual speakers and s-FTR/ w-FTR languages, the regression models run failed to produce a valid amount of significant results. What could be seen, however, was a positive correlation between s-FTR and risk-taking in 4 out of 5 regressions, which could indicate somewhat of an effect that speakers of s-FTR languages would be more likely to take risks, though these were accompanied by very large standard errors. Similarly, the results from the questionnaire produced too small a sample to conclude any significance. One pattern that can be identified, however, is that the variable "parenteducation", where the parents' level of education was ranked from 1-4 (1 signified completion of elementary school and 4 completion of postgraduate

[15] McFadden's R^2 was used as it is partly the most common pseudo-R^2 (Veall & Zimmerman, 1996), and it is also the default pseudo-R^2 used in the statistical software STATA. It is also simple to calculate in the software R, used in the present paper, allowing for comparative calculations to be made if necessary.

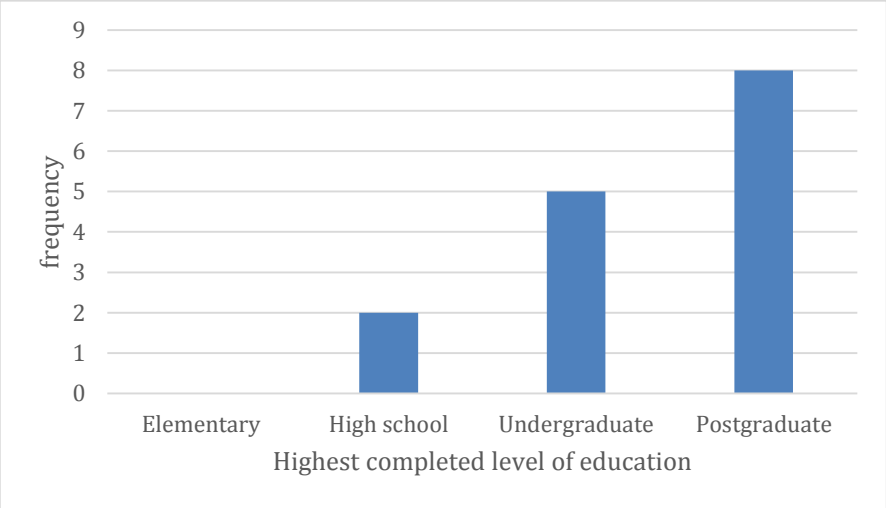
studies), had a consistent negative effect in all models, implying that children of parents with high education were less likely to take risks. However, due to the mostly inconsistent results, they regressions were left out of this section[16].

4.3. Questionnaire Analysis

As previously mentioned, a great loss was experienced in gathering data through the questionnaire. Only 15 responses to the questionnaire were submitted, resulting in a very small sample. Out of the 15 respondents, 13 were mothers to the children and 2 were fathers. 9 were born abroad, and 6 were born in Sweden. The languages at home (spoken by the child) overlapped with the languages spoken by the parents, though two parents reported speaking more languages than those used at home. 100% responded that the parents were the main caretakers of their children.

Also, the level of education seemed to be very high, with 53.3% of the respondents admitting to have a postgraduate degree, 33.3% having an undergraduate degree and 13.3% having a high school degree. This can be seen in **Figure 14**.

Figure 14



When it came to assessing their children, most parents responded that their child was "quite" dominant in a group, though "hardly" was the second most common reply. 10 replied that their child "absolutely" likes to play with others, and the vast majority (13)

[16] They are nevertheless available for viewing in Appendix H, as **Table 13** and **Table 14**.

also reported their child being either “absolutely” or “quite” able to assert themselves in a group. The majority also reported that their child was “quite” self-confident and “absolutely” able to interact with adults. 2 children were said to “not at all” be dominant in a group, and 5 were said to “hardly” be dominant. The results can be seen in **Table 10**.

Table 10. Parent responses to “How would you describe your child?” part 1.

	Absolutely	Quite a lot	Hardly	Not at all
Usually dominant in a group	6.7%	40%	33.3%	20%
Likes to play with others	66.7%	33.3%	-	-
Can assert themselves well in a group of children	46.7%	40%	13.3%	-
Self-confident	33.3%	60%	6.7%	-
Able to talk/ interact with adults	60%	26.7%	13.3%	

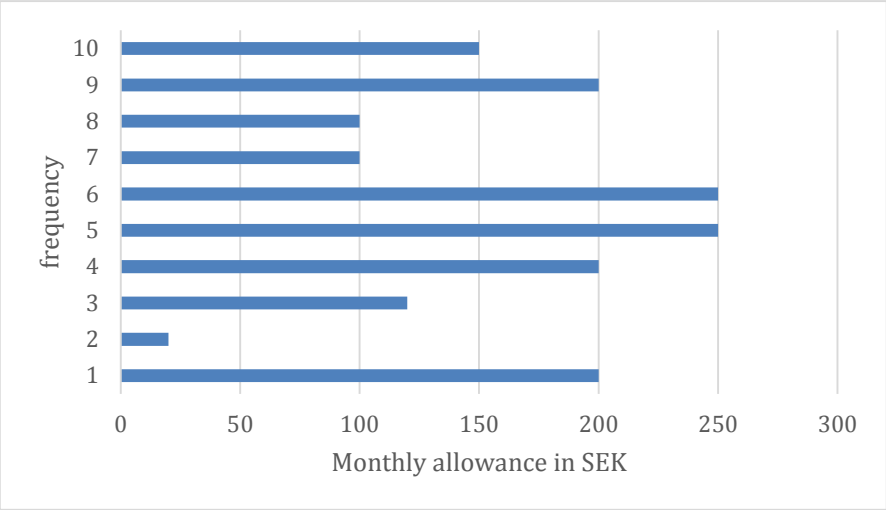
In the second part of describing the child, respondents majorly reported that their child “sometimes” talks excessively (9), while some say that it occurs “often” or even “very often” (2 and 2 respectively). Half of the children are however, thought to “never of rarely” blurt out answers, while some sometimes do (6). The children are also “never or rarely” regarded as easily distracted, having difficulty waiting their turn or interrupting or intruding to a greater extent, though 2 children were thought of as being easily distracted “often”. The results can be seen in **Table 11**.

Table 11. Parent responses to “How would you describe your child?” part 2.

	Never or rarely	Sometimes	Often	Very often
Talks excessively	6.7%	66.7%	13.3%	13.3%
Blurts out answers before questions have been completed	53.3%	40%	6.7%	-
Is easily distracted	53.3%	33.3%	13.3%	-
Has difficulty awaiting their turn	66.7%	26.7%	6.7%	-
Interrupts or intrudes on others	66.7%	33.3%	-	-

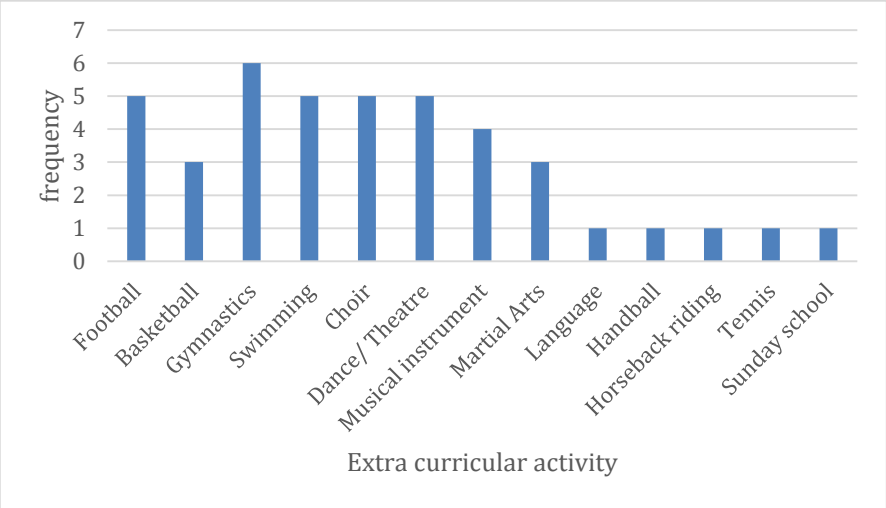
10 parents reported their children as receiving pocket money, with the monthly allowance ranging from 20 SEK to 250 SEK, at an average of 159 SEK (seen in **Figure 15**). The remaining 5 parents did not report their children receiving any pocket money at all.

Figure 15



Lastly, when asked if their child participates in any extracurricular activities, 14 parents replied that their child did so. Group activities, such as football, basketball, gymnastics, dance, choir and theatre were among the most common, and no case of children only participating in solo activities (such as only piano, for example) was reported. The activities reported can be found in **Figure 16**.

Figure 16



5. Discussion

The main differences in risk attitudes that can be seen between monolingual and bilingual children are that bilinguals were more frequently risk averse than monolinguals. This presented itself both in the measurements of relative frequency and in the regression models, where significant correlations were negative between bilingualism and risk-taking propensity. This is also in accordance with the aforestated hypothesis that predicted a negative relationship between bilingualism and risk seeking. As Friedline (2015) mentions, cognitive and linguistic developmental gains are beneficial to a child's ability to become a well-rounded economic agent, and they "shape children's acquisition of economic knowledge and behavior" (p. 43). At this early stage in development, between the ages of 8-12, it is then possible to assume that bilingual children display more risk-averse behavior, in line with the behavior of older adolescents and adults. This could perhaps be due to their more developed cognitive and linguistic abilities (such as having greater cognitive flexibility and linguistic tendencies to understand hypothetical speech). However, it cannot be excluded that the differences may be due to culture, upbringing or school setting, as the two schools largely differ in curriculums (School 1 is a private school, meaning that they follow their own set curriculum[17], while School 2 is a public school, following the curriculum set by Stockholm County). This could be seen in regression model (4) in **Table 9**, where the participants' school had a significant effect on risk-taking probability. School 1's curriculum could then be encouraging risk-taking behavior in some way. In regards to upbringing, bilingual children may have spent more time abroad, been exposed to different currencies, moved more frequently, etc. all of which could contribute to their risk-taking behavior.

While the sample of monolingual students used to observe differences among s-FTR and w-FTR speakers did not provide any significant results when using regression, due to small sample size, the frequency distributions conducted on that sample showed slight differences between types of languages. Unlike the case of monolingual and bilingual speakers, s-FTR speakers were more often taking risks than w-FTR speakers throughout all the tasks, and the difference persisted when examined amongst genders. s-FTR

[17] In this case, School 1's set curriculum follows the IPS (International Primary Curriculum) for grades K-5.

speakers were thus more risk prone amongst both girls and boys. While Chen's (2013) and Legetporer et al.'s (2014a) studies did not explicitly measure risk-taking, the assumed behavior is that speakers of languages with strong future time references separate the future and present and thus "induce less future-oriented behavior" (Legetporer et al., 2014a, p. 2). The present study hypothesized that speakers of s-FTR languages would be more inclined to pursue choices that would yield immediate, or present, satisfaction, whereas speakers of w-FTR languages would be more wary, perhaps considering the outcome of not winning and thus choosing to be "safe" in the last task instead of taking a risk, in order to gain as many prizes as possible. The results showed that hypothesis to generally hold true, though regressions failed to find any significant effect.

Previous research on gender and risk-taking behavior has largely found there to be a negative effect on being female. Cárdenas et al. (2012) mention that "little is known about how the gender gap in economic preferences varies with age" (p.12), referring to mixed results in such studies. The frequency distributions initially showed that girls were the greater risk-takers in task 1, while boys dominated in tasks 2 and 3 and for taking a risk in all tasks. This seemed to correspond to earlier studies by Charness et al. (2013), Charness and Gneezy (2012), Byrnes et al. (1999) and Powell and Ansic (1997), whilst perhaps alluding to Booth and Nolen (2012) who found that differences in elicitation methods (such as the difference in task 1 and task 3, for example) could lead to irregularities. Amongst children, however, previous research has found mixed results, thereby possibly also accounting for the irregularity of the results in task 1. The argument of "nature" versus "nurture" in the risk-taking propensity of girls and boys has largely leaned toward nurture, or social norms, affecting girls' behavior, rendering them more risk averse. This iterates itself in Booth and Nolen's (2012) study, where they found that girls and boys attending same-sex schools were equally prone to risk seeking behavior. Controlling for mono- and bilingualism, it was seen that monolingual girls were more risk averse in all tasks except task 1. The same holds true for bilingual girls. This may indicate a flaw in the experimental design, as the elicitation method used in this study had not been used in other studies and therefore lacks comparison. It could also be a case of a gambler's fallacy effect occurring, as most boys who chose the "risky" option received a white dice (win), while most girls received a black dice (loss). This could have affected girls' risk taking propensity, as the outcome of the first task has a significant correlation to whether or not the participant took a risk in task 2 (as seen in model (3) in **Table 9**).

Gardner and Steinberg (2005) explain how risk seeking behavior diminishes over time, and that younger people "engage in more risky behavior than do adults" (p. 625). Regarding those under the age of 9 as younger children and those over as older, the initial data showed the expected effect, i.e. that younger children more often took risks than older children did. When comparing monolingual girls and monolingual boys, the younger children were in both groups greater risk-takers. Amongst bilingual boys, however, older boys were more risk seeking than young boys. Older bilingual boys then, may have developed a more positive attitude towards risk over time. Cárdenas et al. (2012) mention that previous studies on children saw boys increasing in competitiveness around the ages of 13-15 in patriarchal societies, which could be an indication of what is occurring in older bilingual boys in this study. As the majority of bilingual older boys attended School 1, and older monolingual boys School 2, there may be an educational or cultural effect rendering older bilinguals (international children) more risk prone than older monolinguals (Swedish children). Older bilingual girls were also more often risk seeking than older monolingual girls, resulting in another instance where cultural factors may play a part in children's risk attitudes.

The significant results regarding "age" and "oldchild" from the regression models indicate a negative relationship between age and risk propensity, meaning that either being a year older or being classified as an older child would lead to a lower probability of choosing a risky option. This is in similarly shown in Legetporer et al. (2014a), where the researchers found a positive relationship between age and patience, meaning that older children are more likely to wait longer for rewards than younger children. Children in higher grades (Legetporer et al., 2014b) were also seen to exhibit behavior indicating consideration of others and non-selfishness, which "is a lubricant for the well-functioning of institutions, markets and societies as a whole" (p.1). Older children, then, in general, display more risk-averse behavior than younger children, though older bilingual boys are an exception in this study.

The results from the questionnaire were largely inconclusive, due to the low rate of replies gathered. Supplementary demographic information could have been used in regressions to further investigate the effect of background on a child's risk-taking propensity. In particular, foreign-born parents could indicate a cultural difference between children. Disregarding the language skills, cultural influences may be had on the child that strongly

affect their behavior. Flurry (2007) and Shim et al. (2011) are of the view that children and parents engage in a relationship whereby the two affect each other's consumption patterns. Parents ultimately shape "the trajectory of [children's] path toward adulthood" (Shim et al., 2011, p. 290) and so, more background demographic information about the parent, and in particular about foreign-born parents would have been desired. For example, in the small data sample gathered, a negative effect is put on risk taken in all tasks by parent education. Children of parents with high education (i.e. postgraduate degrees) were less likely to engage in risk seeking behavior. Also, measurements regarding children's' allowance could have been made if the data was more extensive. As of now, no result was significant enough to draw conclusions from. Dohmen et al. (2011), surprisingly, found some significance in the height of children, suggesting that as much background data should be gathered as possible, both in regard to children's biological and cultural discrepancies and their parents' as well.

Sample size is a reoccurring problem in the present study. The size led to mainly small significant results in the regressions and, as mentioned, inconclusive results in questionnaires and among monolingual children (s-FTR/ w-FTR speakers). Further research would benefit from a larger sample, and even investigating children in peer/ group settings, as Gardner and Steinberg (2005) point at peer influence playing a part in elicitation of risk attitudes. Also, while a great deal of research spans the ages between adolescence and adulthood, little handles children under the age of 14. A wider age distribution, (from the early ages of 5 and 6, who Friedline (2015) recognizes as able to comprehend economic interactions) to the beginnings of adolescence (where individuals are able to conduct economic interaction without, for example, the influence of parents) would help produce a larger sample and more clearly regard the effects of age on risk-taking. More extensive background information would also help clarify the varied results in some observations, and provide a greater understanding of disparities in gender and age groups.

6. Conclusion

Through a controlled experiment conducted on two groups of children monolinguals and bilinguals in two different schools in Stockholm, the present study has investigated willingness to take risk in three subsequent task involving a safe choice and a lottery choice. Results have indicated a difference in risk attitudes between children in these two groups. Bilingual children exhibited a lower propensity to take risks than monolinguals, which could be due to the more developed cognitive and linguistic gains made by bilinguals at these ages (8-12 years). Whilst savings rates and intertemporal choice had previously been studied in conjunction with s-FTR and w-FTR languages, risk-taking propensity as a dependent variable had not. The results from this study show that speakers of w-FTR languages are more risk averse than speakers of s-FTR languages, regardless of gender. Similarly, girls showed a tendency to be more risk averse than boys, which corresponds to the existing literature on the subject, though task 1 showed greater risk seeking in girls, possible accounting for some differences in the elicitation method. This difference may be attributed to different approaches to gender equality between the schools, and also a difference in gender roles between the cultures of some (international) bilingual students and Swedish students. Age also showed to be a variable that exhibited a significant relationship, insomuch that older children were generally more risk averse than younger. However, a group of older bilingual boys proved to be an exception. A post-experimental questionnaire was sent out, but due to the low reply rate, results were proven difficult to interpret. The trends seen from this small sample indicate a negative correlation between parental education and risk attitude, though results were not significant and inconclusive.

To further investigate this topic, larger samples should be used as well as more background information gathered. This may aid in proving stronger relationships between linguistic skills and risk attitudes, aiding researchers, educators and policy-makers in making information about economic transactions and decisions available and understood by children. Further research on this topic could also be used to understand how economic behavior is developed over time, which would better help understand the nuances of irrational behavior exerted by economic agents in real-life.

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Appendix A

Reproduced consent form signed by a parent.

MONOLINGUAL vs. BILINGUAL CHILDREN'S RISK ATTITUDES: An Experiment

Diana Frederiksen, Lund University, frederiksen.diana@gmail.com
Supervisor: Natalia Montinari, Lund University, natalia.montianri@nek.lu.se

Dear Parent,

My name is Diana Frederiksen and I am currently writing a Bachelor's degree project in Economics at Lund University. I am specializing in the field of Behavioral Economics, studying risk-taking behavior in children. I am asking for your consent to observe and interact with your child in an experimental study.

The studies will be conducted at your child's school in a classroom and last about 15-20 minutes, as scheduled by the researcher along with the parents. The session will take place after school hours, so as not to interfere with your child's curriculum.

The purpose of this study is to examine choices/ preferences made by children who speak one vs. two languages. As such, two groups will be studied: monolingual and bilingual speakers. The participation of your child in this study is voluntary, and s/he may withdraw his or her participation at any time without any penalty.

The researcher will assign a number tag to each child and subsequently explain the rules of the task. The particulars of the study cannot be fully disclosed at this time, but involves simple choices to be made whilst, for example, tossing a coin, and then discussing the outcome with the child. At the end of the study, your child will receive some small prizes as compensation for his/her participation in the study. Prizes used in the study may include school materials or small toys.

Data will be kept confidential by removing identifiers as soon as the data is transferred to computer files that will be used for data analysis. At this point, any questionnaires with identifiers will also be destroyed.

If you have any questions about the study, please do not hesitate to e-mail me at frederiksen.diana@gmail.com

I have read the description of this study and I give my consent to let my child participate in the study.

Signature of Parent:_____

Name of the Parent (printed):_____

Contact information: _____

My child is: (name, grade_____)

☐ Monolingual (please state language: _____)

☐ Bilingual (please state languages: _____)

Date _____

Appendix B

Experimental instructions (English version)

Note: Italic font is used to denote actions of the experimenter and subject

Experimental instructions (April 2015)

Hi, my name is Diana and I am a student at Lund University. Do you remember me? Good. You are going to participate in some activities with me.
It is completely voluntary and only those who want can participate. You are free to stop playing at any time. The activities in which you will participate are very simple, and you could end up winning some small prizes.
Also, it is important that you don't tell your classmates what the activity is, just keep it a secret. When everyone has done the tasks I'll let you know and then you can talk about it.
Remember, you are allowed, at any time, to choose not to participate in the task and you can leave whenever you want, no problem. If you don't understand anything, just let me know.

Experimental instructions – Individual task 1

Now I'll let you know what we're going to do. I will give you three small tasks. In each task, you will be able to win some stickers – such as these **show stickers**. The stickers can in the end be exchanged for some prizes. These are the prizes **show prizes** and you can get one prize for each sticker you win. You will be able to choose between two different options. You can either choose to receive some dots straight away, or pick the bag ***show bag***.

The bag contains two dice, one white and one black **show dice**. You have to pick one dice without having the possibility to look into the bag, like this ***mimic what they have to do***. If the dice is WHITE, you could get more stickers. If the dice is BLACK you could get less stickers. In each activity, I will tell you in detail. Do you understand?

The first task goes like this:

You can either get 1 sticker straight away, or choose the bag and pick a dice. If you get a WHITE dice, you will get 2 stickers. If you get a black dice, you will get 0 for this task.

Do you understand? How many stickers will you get if you DO NOT choose the bag? How many stickers will you get if you choose the bag and get a WHITE dice? How many will you get if you choose the bag and get a BLACK dice?

Okay, great. Now, we start. Are there any other questions before we start?

What do you want to do - choose the stickers, or the bag?

If sticker: Now you have 1 sticker.

If bag: Now pick a dice from the bag….**picks dice***

WHITE: Now you have 2 stickers.
BLACK: Sorry, no stickers this time.

Thanks for participating in the first task!

Experimental instructions - Individual task 2

Now we're going to do another task: I'm once again going to give you two choices. You can either choose to get 2 stickers straight away – or choose the bag. If the dice is WHITE you will get 3 stickers. If the ball is BLACK you will get 1 sticker.

Do you understand? How many stickers will you get if you DO NOT choose the bag? How many stickers will you get if you choose the bag and get a WHITE dice? How many will you get if you choose the bag and get a BLACK dice?

Okay, great. Now, what do you want to do? Choose the stickers or the bag?

If sticker: Now you have 2 stickers.
If bag: Now pick a dice from the bag…**picks dice**

WHITE: Now you have 3 stickers.
BLACK: Now you have 1 sticker.

Thanks for participating!

Experimental instructions – Individual task 3

Here is the next task. You can either get 3 stickers straight away, or choose the bag. If you get a WHITE dice, you will get 10 stickers. If you get a black dice, you will get 0.

Do you understand? How many stickers will you get if you DO NOT choose the bag? How many stickers will you get if you choose the bag and get a WHITE dice? How many will you get if you choose the bag and get a BLACK dice?

Okay, great. Now, what do you want to do - choose the stickers, or the bag?

If sticker: Now you have 3 stickers.
If bag: Now pick a dice from the bag….**picks dice**

WHITE: Now you have 10 stickers.
BLACK: Sorry, no stickers this time.

Thanks for participating!

Appendix C

Experimental instructions (Swedish version)

Note: Italic font is used to denote actions of the experimenter and subject

Experimentanvisningar (april 2015)

Hej, jag heter Diana och är en student på Lunds Universitet. Minns du mig? Bra. Du kommer att delta i några aktiviteter med mig.
Det är helt valfritt och endast de som vill behöver vara med. Du får sluta delta närsomhelst.
Aktiviteterna som du kommer att göra är väldigt enkla, och i slutet kommer du kunna vinna små priser.
Det är också viktigt att du inte berättar för dina klasskamrater vad aktiviteten är; håll det hemligt. När alla har deltagit så säger jag till och då får ni prata om det.
Kom ihåg, du får närsomhelst välja att inte delta I uppgiften och du går gå när du vill utan problem. Om det är något du inte förstår är det bara att säga till.

Experminentanvisningar – Individuell uppgift 1

Nu kommer jag att berätta vad vi ska göra. Jag kommer att ge dig tre små uppgifter. I varje uppgift har du möjlighet att vinna några klistermärken – som dessa **visa klistermärken** . I slutet av alla uppgifter kommer du kunna byta ut klistermärkena mot några priser. Dessa är priserna **visa priserna** och du får ett pris för varje klistermärke du vinner. Du kommer först att få välja mellan två alternativ. Antingen kan du välja att få några klistermärken på en gång, eller välja påsen **visa påsen**.

I påsen finns det två tärningar, en vit och en svart **visa tärningar**. Du får välja en tärning utan att kunna titta i påsen, såhär **visa hur de ska göra**. Om tärningen är VIT har du chans att få fler klistermärken. Är tärningen SVART har du chans att få mindre. Inför varje uppgift kommer jag att förklara mer noggrant. Förstår du?

Första uppgiften går till såhär:

Du kan antingen få 1 klistermärke på en gång, eller välja påsen och ta en tärning. Om tärningen är VIT får du 2 klistermärken. Om tärningen är SVART får du 0 klistermärken för denna uppgift.

Har du förstått? Hur manga klistermärken får du om du INTE väljer påsen? Hur många får du om du väljer påsen och får en VIT tärning? Hur många klistermärken får du om du väljer påsen och går en SVART tärning?

Toppen. Då börjar vi. Har du några frågor innan vi börjar?

Vad vill du göra – välja klistermärkena eller påsen?

Om klistermärke: Nu har du 1 klistermärke
Om påse: Välj nu en tärning ur påsen: **väljer tärning**
VIT: Nu har du 2 klistermärken.
SVART: Tyvärr, inga klistermärken denna gång.

Tack för att du deltog i första uppgiften!

Experminentanvisningar – Individuell uppgift 2

Nu ska vi göra en till uppgift: återigen kommer du att få två alternativ. Antingen kan du få 2 klistermärken på en gång – eller så väljer du påsen. Om tärningen i påsen är VIT får du 3 klistermärken. Om tärningen är SVART får du 1 klistermärke.

Har du förstått? Hur manga klistermärken får du om du INTE väljer påsen? Hur många får du om du väljer påsen och får en VIT tärning? Hur många klistermärken får du om du väljer påsen och går en SVART tärning?

Toppen. Vad vill du göra – välja klistermärkena eller påsen?

Om klistermärke: Nu har du 2 klistermärken
Om påse: Välj nu en tärning ur påsen: **väljer tärning**
VIT: Nu har du 3 klistermärken.
SVART: Nu har du 1 klistermärke.

Tack för att du var med!

Experminentanvisningar – Individuell uppgift 3

Här kommer nästa uppgift. Du kan antingen få 3 klistermärken på en gång eller välja påsen. Om tärningen i påsen är VIT får du 10 klistermärken. Om tärningen är SVART får du 0 klistermärken.

Har du förstått? Hur manga klistermärken får du om du INTE väljer påsen? Hur många får du om du väljer påsen och får en VIT tärning? Hur många klistermärken får du om du väljer påsen och går en SVART tärning?

Toppen. Vad vill du göra – välja klistermärkena eller påsen?

Om klistermärke: Nu har du 3 klistermärken
Om påse: Välj nu en tärning ur påsen: **väljer tärning**
VIT: Nu har du 10 klistermärken.
SVART: Tyvärr, inga klistermärken denna gång.

Tack för att du var med!

Appendix D

Post-experimental information collection form.

Child number:_____

Now we are finished; I just want to ask you some quick questions / *Nu är vi färdiga: jag vill bara ställa ett par snabba frågor.*

- How did you feel before the experiments? How do you feel now?/ *Hur kändes det innan experimenten? Hur känns det nu?*
- Was there anything you thought was unclear or difficult to understand?/ *Var det något som du tyckte var oklart eller som du inte förstod?*
- How do you feel about your choices?/ *Vad tycker du om dina val?*
- Would you have done anything differently? / *Skulle du ha gjort någonting annorlunda?*

Thank you for answering my questions! Now, here are the prizes: you are welcome to pick any prize you want, one for each sticker you collected. / *Tack! Här är priserna, varsågod att välja vilka du vill, en sak för varje klistermärke du fick.*
Show prizes again – these include paper clips, balloons, colorful stickers and loom bands*
Thank you, and remember not to tell anyone what the tasks were or how you did. I'll let you know when everyone is finished, after which you can talk about it. Okay? Thank you and goodbye! /*Tack! Kom ihåg att inte berätta för någon vad uppgifterna var eller vad du gjorde, okej? Jag säger till när alla är färdiga och då får ni prata om det. Okej? Tack och hej då!*

Demographic information for each child

Name	
Age	
Grade	
Gender	
Monolingual (language)	
Bi-/ Multilingual (languages)	
Date and time of experiment	
School	

Choices (outcome)

Task order	Sticker	Bag - WHITE	Bag - BLACK
Task 1			

Appendix E

Questionnaire sent out to parents.

1. Name of child: _____

2. Your relation to child:
□ Father
□ Mother
□Other (please specify):_____

3. How many family members are currently living in your house? _____

4. Your place of birth: _____ Your spouse's place of birth: _____

5. What languages:
Are spoken at home: _____
Are spoken by you: _____
Are spoken by your spouse: _____

6. Your level of education:
□ Elementary school
□ High School
□ University
□ Postgraduate

Your spouse's level of education:
□ Elementary school
□ High School
□ University
□ Postgraduate

7. Who regularly takes care of your child when s(he) is not at school?
□ Parents
□ Grandparents
□ Other relatives
□ Babysitter
□ Other (please specify): _____

Continued on next page…

8. How would you describe your child?

	Absolutely	Quite a lot	Hardly	Not at all	Do not wish to say
Usually dominant in a group					
Likes to play with others					
Can assert themselves well in a group of children					
Self-confident					
Able to talk/ interact with adults					

9. How would you describe your child?

	Never or rarely	Sometimes	Often	Very often	Do not wish to say
Talks excessively					
Blurts out answers before questions have been completed					
Is easily distracted					
Has difficulty awaiting their turn					
Interrupts or intrudes on others					

10. Does your child receive an allowance/ pocket money?

□ No

□ Yes

If yes, amount per month (in SEK): _____

11. Does your child partake in any extra-curricular activities?

□ No

□ Yes

If yes, please specify: _____

Appendix F

Raw data, coded in Excel.

Raw data from experiments

child_id	girl	bilingual	languages	age	grade	risk1	outcome1	risk2	outcome2	risk3	outcome3	order32	sisschool	riskall	bilingualage	lasttask	secondtask	oldchild	outcomesecond
10	0	0	Korean	8	3	1	2	1	3	1	10	0	1	1	0	1	1	0	3
18	0	0	Japanese	8	3	1	2	1	1	1	0	0	1	1	0	1	1	0	1
19	1	0	English	8	3	1	2	1	3	1	10	1	1	1	0	1	1	0	10
29	0	0	Swedish	9	3	1	0	1	1	1	10	1	0	1	0	1	1	0	10
30	0	0	Swedish	9	4	1	2	1	1	1	0	0	0	1	0	1	1	0	1
31	0	0	Swedish	9	4	1	2	1	1	1	10	1	0	1	0	1	1	0	10
35	0	0	Swedish	9	4	1	2	1	1	1	10	1	0	1	0	1	1	0	10
36	0	0	Swedish	9	4	1	2	1	3	1	10	0	0	1	0	1	1	0	3
37	0	0	Japanese	9	3	1	0	0	2	1	10	1	1	0	0	1	0	0	10
5	1	0	English	9	3	1	2	1	3	1	0	1	1	1	0	1	1	0	0
34	1	0	Swedish	9	4	1	2	1	3	0	3	0	0	0	0	1	0	0	3
24	0	0	Swedish	10	4	0	1	1	1	0	3	0	0	0	0	1	0	1	1
14	1	0	Portugese	10	4	1	0	0	2	1	10	0	1	0	0	0	1	1	2
32	1	0	Swedish	10	5	1	0	0	2	1	0	0	0	0	0	0	1	1	2
33	1	0	Swedish	10	5	1	0	0	2	1	10	1	0	0	0	1	0	1	10
17	1	0	Japanese	11	5	1	0	0	2	1	0	1	1	0	0	1	0	1	0
22	1	0	Swedish	11	5	0	1	1	3	1	0	0	0	0	0	1	1	1	3
39	0	0	Swedish	12	5	0	1	1	3	1	0	1	0	0	0	1	1	1	0
23	1	0	Swedish	12	5	1	2	0	2	0	3	1	0	0	0	0	0	1	3
38	1	0	Swedish	12	5	0	1	1	1	1	0	0	0	0	0	1	1	1	1
8	0	1	Swedish + English	8	3	1	2	0	2	1	10	0	1	0	8	0	1	0	2
1	1	1	Italian + English	8	3	1	0	1	3	1	10	1	1	1	8	1	1	0	10
20	1	1	Swedish + English	8	3	1	2	0	2	1	0	0	1	0	8	0	1	0	2
13	0	1	Spanish + English + Finnish	9	3	0	1	1	1	0	3	1	1	0	9	0	1	0	3
21	0	1	Swedish + Polish	9	4	1	2	0	2	1	10	1	0	0	9	1	0	0	10
27	0	1	Hindi + English	9	4	1	0	1	3	1	10	1	1	1	9	1	1	0	10
3	1	1	Hindi + English	9	4	1	0	0	2	1	10	1	1	0	9	1	0	0	10
9	1	1	Swedish + English	9	4	1	0	1	1	0	3	1	1	0	9	0	1	0	3
15	1	1	German + Dutch + English + Spanish	9	3	1	0	0	2	1	10	1	1	0	9	1	0	0	10
11	0	1	Italian + English	10	5	1	2	1	3	1	0	1	1	1	10	1	1	1	0
26	0	1	Swedish + English	10	4	1	0	0	2	1	0	0	1	0	10	0	1	1	2
28	0	1	Swedish + Spanish	10	4	1	0	1	1	0	3	0	0	0	10	1	0	1	1
40	0	1	English + Hebrew	10	4	1	0	0	2	1	10	0	1	0	10	0	1	1	2
6	1	1	Russian + Greek + English	10	4	1	2	1	1	1	10	0	1	1	10	1	1	1	1
7	1	1	English + Norwegian	10	4	1	2	1	1	1	0	1	1	1	10	1	1	1	0
16	0	1	Mongolian + English	11	5	1	2	1	1	1	10	0	1	1	11	1	1	1	1
25	0	1	English + French	11	5	0	1	1	3	1	10	1	1	0	11	1	1	1	10
2	1	1	English + Mandarin	11	5	1	0	1	1	0	3	0	1	0	11	1	0	1	1
4	1	1	Italian + English + Swedish	11	5	1	0	0	2	1	0	0	1	0	11	0	1	1	2
12	1	1	Hindi + English	11	5	1	0	0	2	0	3	0	1	0	11	0	0	1	2

Raw data from questionnaire

child_id	girl	bilingual	languages	age	grade	risk1	outcome1	risk2	outcome2	risk3	outcome3	order32	sisschool	riskall	bilingualage	lasttask	secondtask	oldchild	outcomesecond
4	1	1	Italian + English + Swedish	11	5	1	0	0	2	1	0	0	1	0	11	0	1	1	2
7	1	1	English + Norwegian	10	4	1	2	1	1	1	0	1	1	1	10	1	1	1	0
9	1	1	Swedish + English	9	4	1	0	1	1	0	3	1	1	0	9	0	1	0	3
16	0	1	Mongolian + English	11	5	1	2	1	1	1	10	0	1	1	11	1	1	1	1
17	1	0	Japanese	11	5	1	0	0	2	1	0	1	1	0	0	1	0	1	0
18	0	0	Japanese	8	3	1	2	1	1	1	0	0	1	1	0	1	1	0	1
19	1	0	English	8	3	1	2	1	3	1	10	1	1	1	0	1	1	0	10
21	0	1	Swedish + Polish	9	4	1	2	0	2	1	10	1	0	0	9	1	0	0	10
22	1	0	Swedish	11	5	0	1	1	3	1	0	0	0	0	0	1	1	1	3
23	1	0	Swedish	12	5	1	2	0	2	0	3	1	0	0	0	0	0	1	3
24	0	0	Swedish	10	4	0	1	1	1	0	3	0	0	0	0	1	0	1	1
38	1	0	Swedish	12	5	0	1	1	1	1	0	0	0	0	0	1	1	1	1
39	0	0	Swedish	12	5	0	1	1	3	1	0	1	0	0	0	1	1	1	0
40	0	1	English + Hebrew	10	4	1	0	0	2	1	10	0	1	0	10	0	1	1	2
13	0	1	Spanish + English + Finnish	9	3	0	1	1	1	0	3	1	1	0	9	0	1	0	3

child_id	allowance	parentforeign	parenteducation	dominant	playful	assertive	confident	adultinteraction	talksalot	blurts	distracted	can't wait	interrupts	householdsize	extraactivity	caretaker
4	200	0	4	2	4	2	3	4	4	4	4	4	4	4	1	parents
7	120	1	4	3	4	3	4	3	3	4	4	4	3	4	1	parents
9	20	1	4	1	4	4	3	4	3	3	3	3	3	4	1	parents
16	200	1	3	3	4	4	4	4	2	3	3	4	4	3	0	parents
17	0	1	2	2	4	3	3	4	4	4	4	4	4	4	1	parents
18	0	1	2	3	4	4	4	4	2	3	2	4	4	4	1	parents
19	0	1	4	2	4	3	2	3	1	3	3	3	3	3	1	parents
21	200	1	4	3	4	4	4	2	3	3	2	2	3	4	1	parents
22	100	0	3	2	3	3	3	3	4	4	4	4	4	4	1	parents
23	100	0	2	1	3	3	3	4	4	4	4	4	4	4	1	parents
24	0	1	4	3	3	4	3	2	3	3	4	4	4	3	1	parents
38	250	0	3	2	3	2	3	3	4	4	4	4	4	4	1	parents
39	250	0	3	4	3	4	4	4	2	2	3	3	3	4	1	parents
40	0	1	4	3	4	3	3	4	4	4	4	3	4	5	1	parents
13	150	1	4	1	4	4	3	4	3	4	4	3	4	4	1	parents

Appendix G

Supplementary figures showing relative frequencies controlling for task order.

Figure 2.1, relative frequency of risk taken per task.

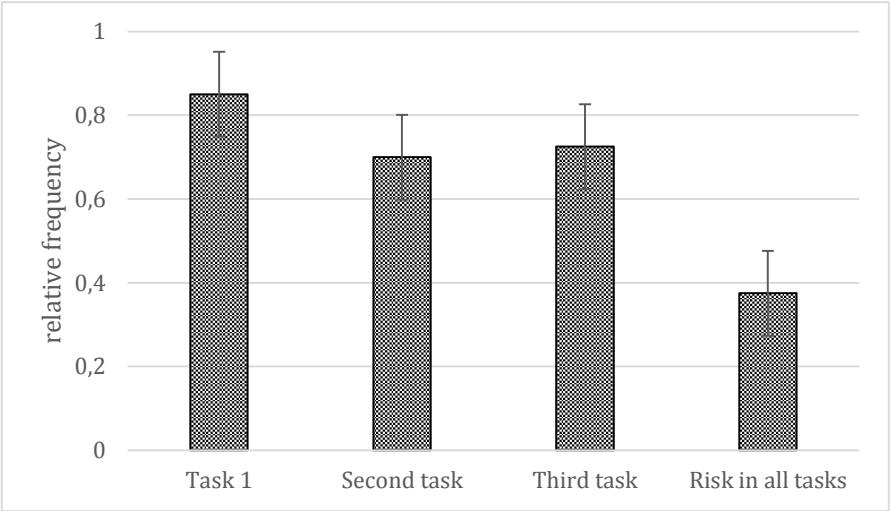


Figure 3.1, relative frequency of risk taken by language skills per task.

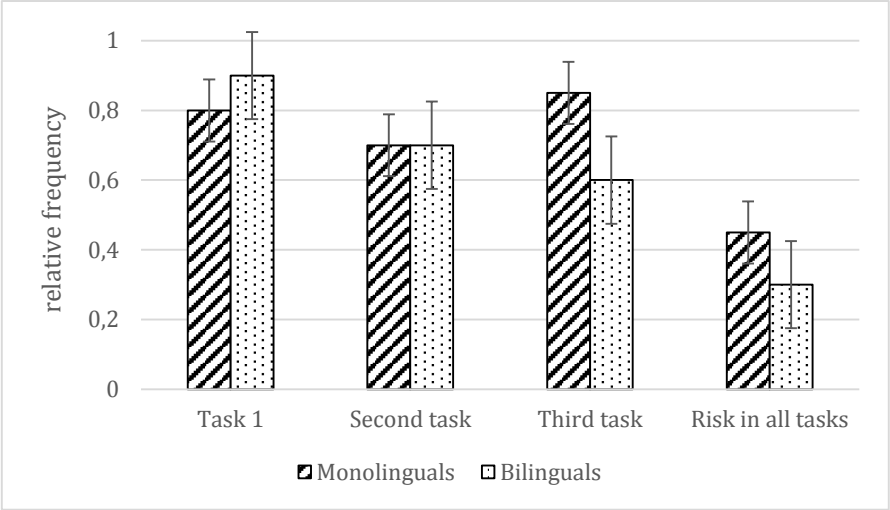
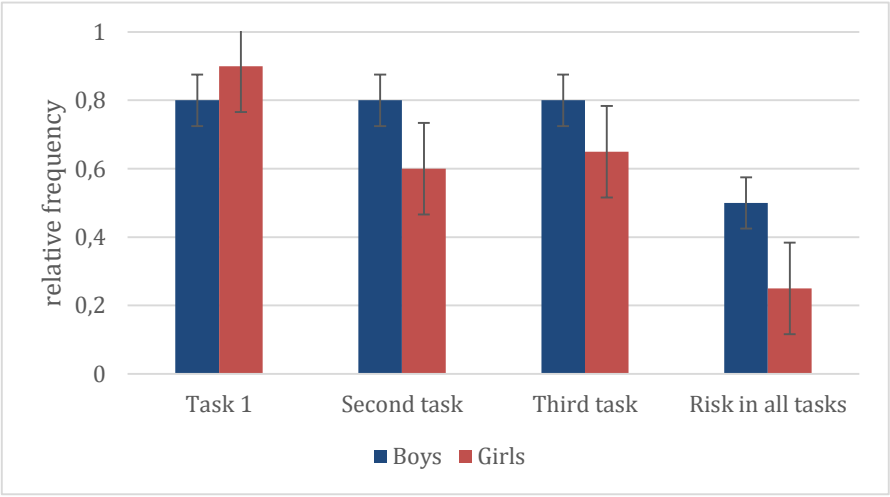
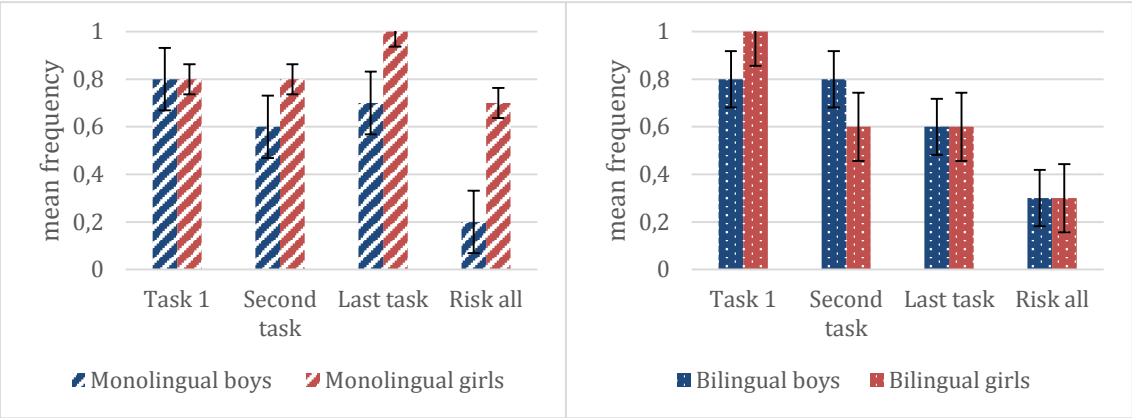


Figure 4.1, relative frequency of risk taken by gender.



Figures 5.1.1 – 5.2.1, risk taken by gender with same language skills.



Figures 6.1.1 – 6.2.1, risk taken by language skills with same gender.

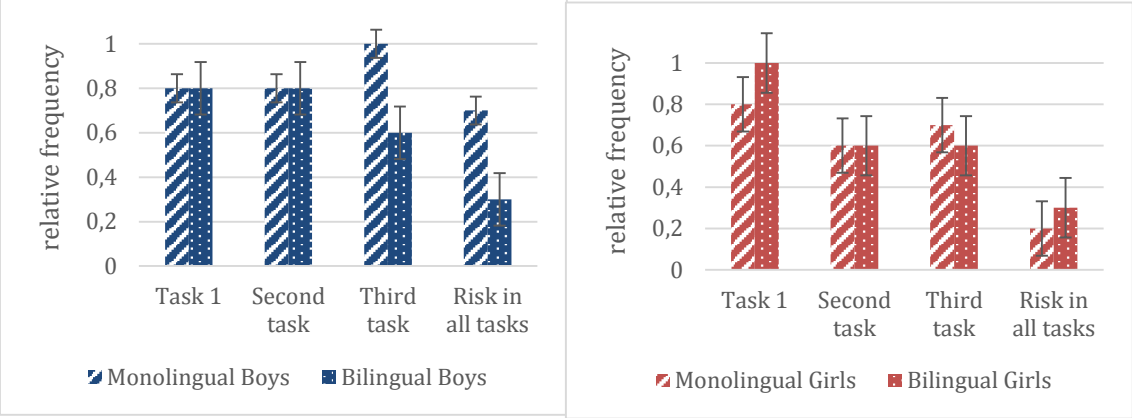


Figure 7.1, relative frequencies of risk taken my monolingual speakers.

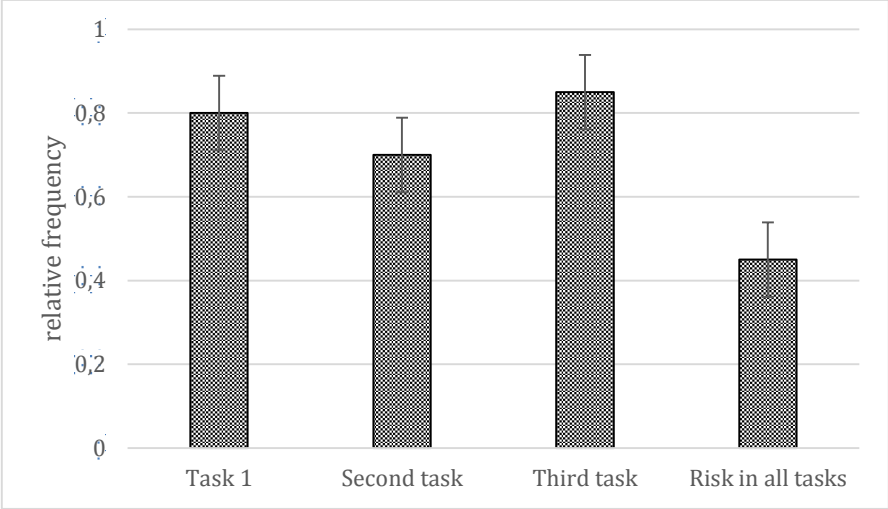
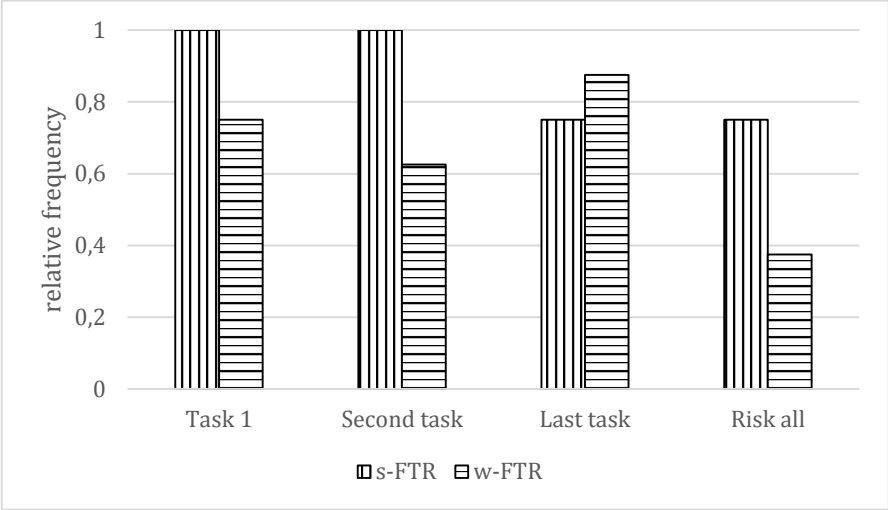


Figure 8.1 relative frequencies of risk taken by language type.



Figures 9.1.1-9.2.1, relative frequencies for same language type by gender. **Figures 9.3.1-9.4.1**, relative frequencies for risk taken for same gender by language type.

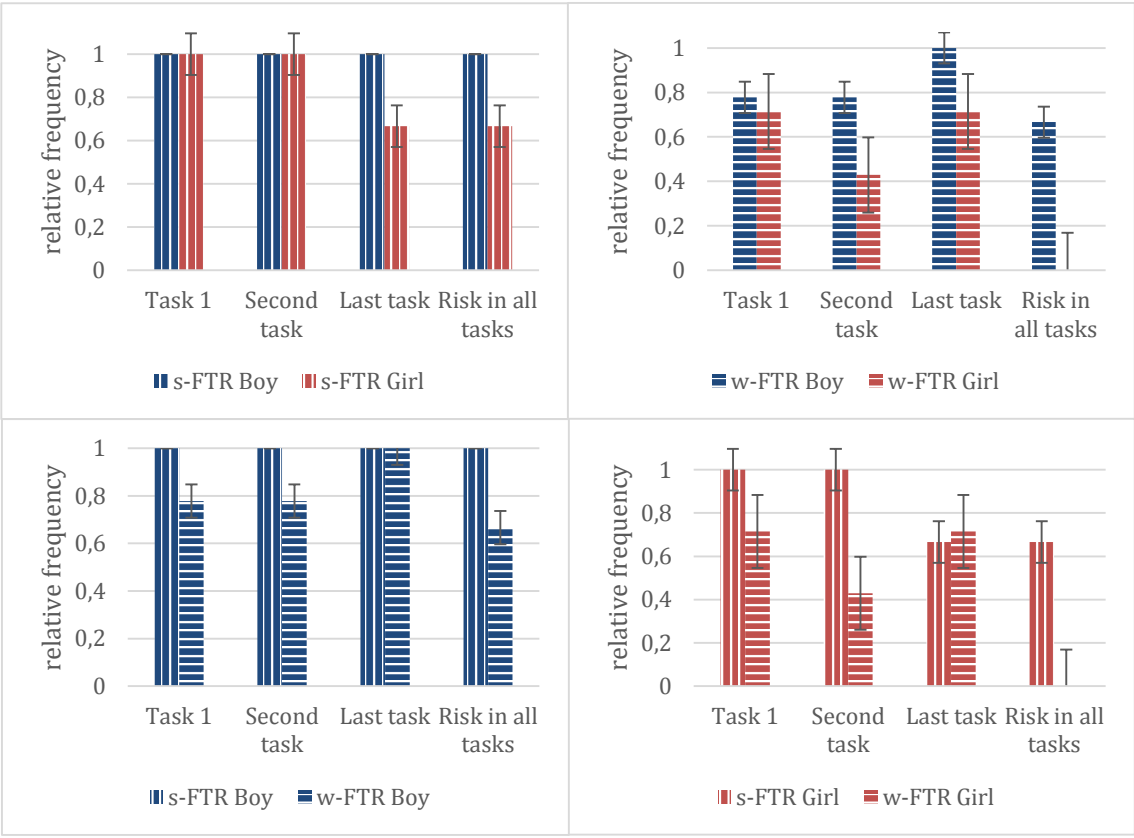
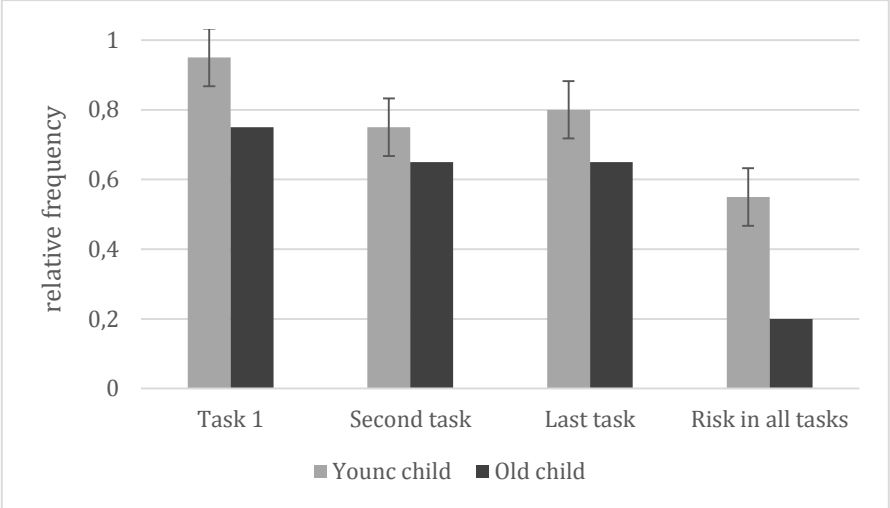
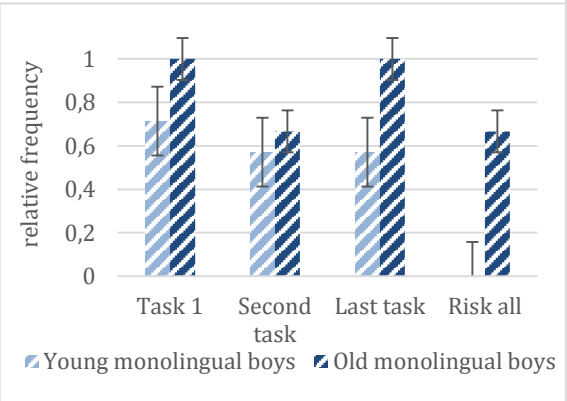
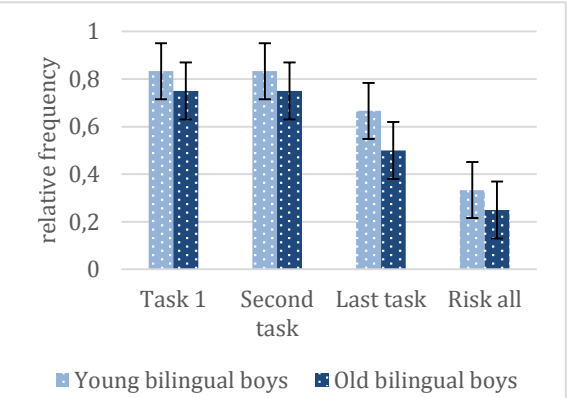


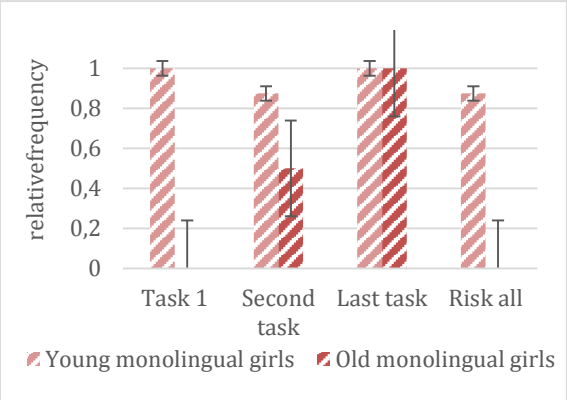
Figure 10.1, relative frequency of risk taken by age (old child >9 years of age).

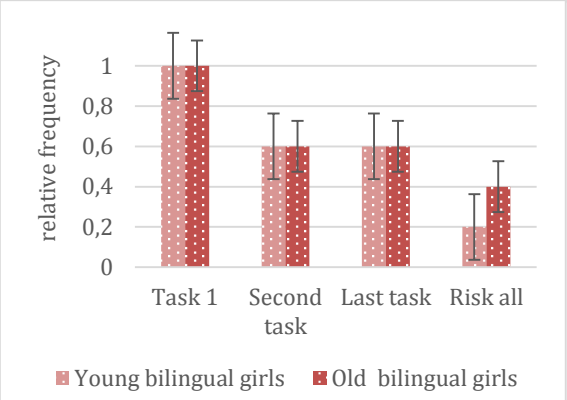


Figures 11.1.1 – 11.4.1, relative frequencies of risk taken by age, gender and language skills.

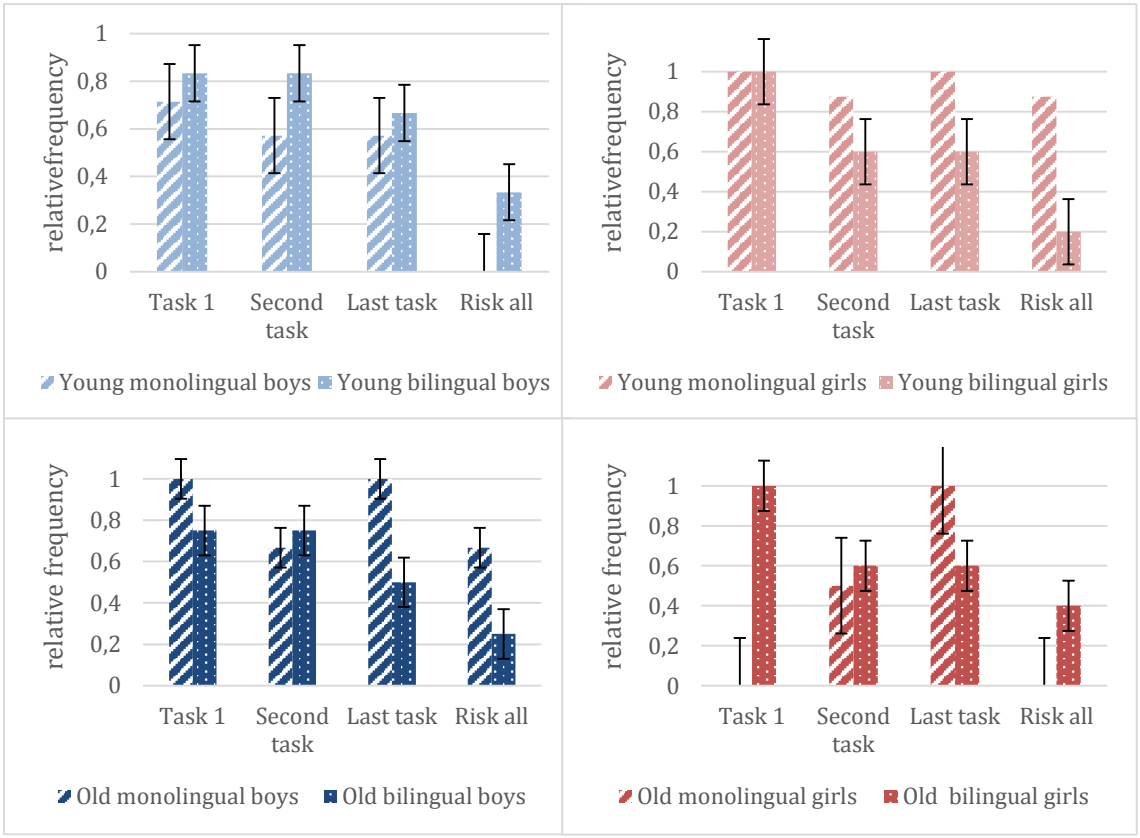




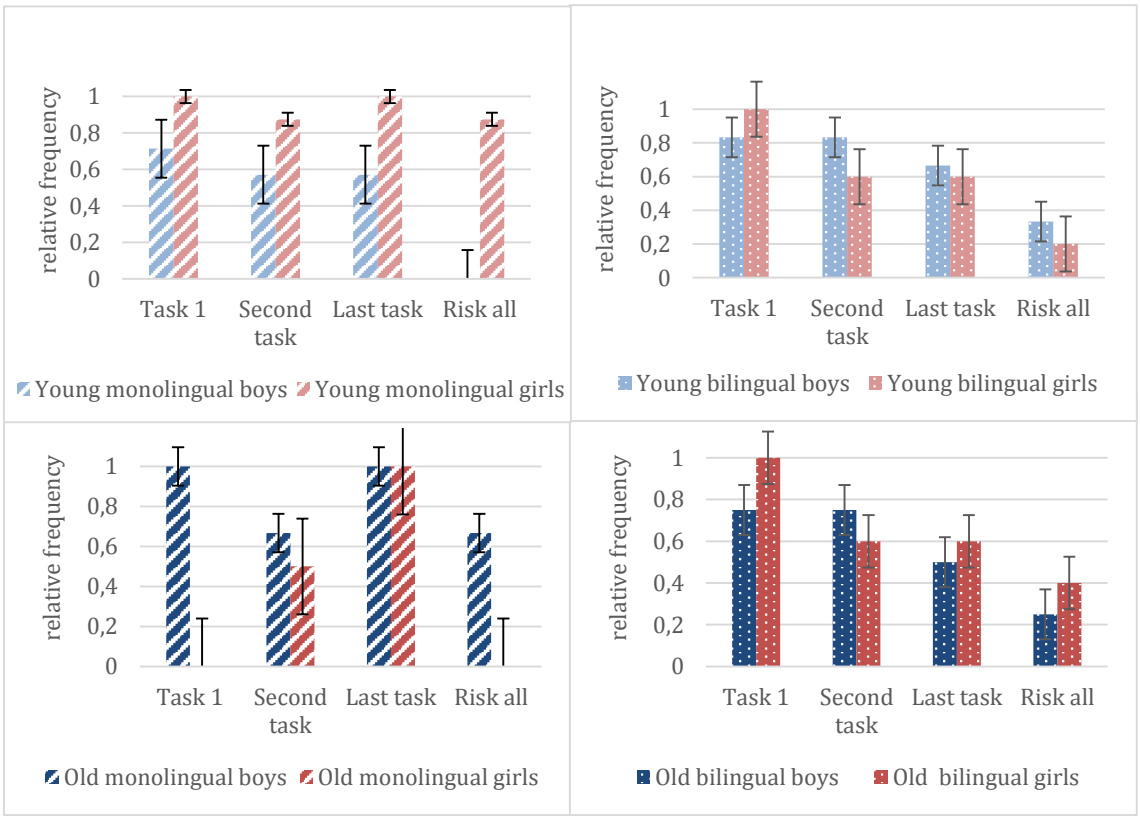




Figures 12.1.1-12.4.1, relative frequencies of risk taken by age, gender and language skills.



Figures 13.1.1-13.4.1, relative frequencies of risk taken by age, gender and language skills.



Appendix H

Supplementary regression tables.

Table 12. Average marginal effects

Model	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Dependent Variable	**Risk in task 1**	**Risk in task 1**	**Risk in task 2**	**Risk in task 2**	**Risk in task 3**	**Risk in last task**
Independent Variables						
bilingual (=1)	0.067	-0.764	-1.500	1.584	1.155	-2.451
girl (=1)	0.226	0.177	-0.028	-0.251	-0.062	-0.022
age (in years)	-0.140	-	-	0.034	-	-0.121
sisschool	0.043	0.059	-0.013	0.539)	-	-0.148
order32	-	-	0.049	-0.149	0.099	0.120
bilingualage	-	0.859	0.162	-0.212	0.118	0.241
oldchild	-	0.272	0.242	0.297	-0.212	-
outcomesecond	-	-	-	0.051	0.014	0.020
risk1	-	-	-1.014	0.238	-	-0.128
outcome1	-	-	0.082	-	-	-
Constant	1.422	0.188	1.039	-0.530	0.127	1.432
Observations	40	40	40	40	40	40

Table 13. Probit regression for monolingual speakers by task.

Model	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Dependent Variable	**Mono risk 1**	**Mono risk 2**	**Mono risk 3**	**Mono Last task**	**Mono Risk all**
Independent Variables					
girl (=1)	0.199	-1.704**	-0.649	-5.607	-6.327
	(0.685)	(0.798)	(1.290)	(711.657)	(850.428)
s-FTR	4.975	1.027	5.270	-0.507	6.371
	(485.122)	(1.023)	(735.440)	(1.290)	(850.428)
order32	-	-0.697	0.096	0.606	-0.236
		(0.737)	(1.579)	(1.401)	(0.985)
outcomesecond	-	-	0.105	0.093	0.089
			(0.179)	(0.162)	(0.112)
sisschool	-	-0.711	-	0.157	0.292
		(0.790)		(1.177)	(0.928)
age (in years)	-	-	0.043	-	-
			(0.828)		
secondtask	-	-	-	0.323	-
				(1.406)	
Constant	0.765	1.974**	0.341	5.468	0.048
	(0.465)	(0.815)	(8.670)	(711.657)	(0.647)
Observations	20	20	20	20	20

Table 14. Probit regression with demographic and parental variables by task.

Model	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Dependent Variable	**risk 1**	**risk 2**	**risk 3**	**Last task**	**Last task**	**Risk all**
Independent Variables						
bilingual (=1)	3.992	0.411	1.115	-2.807	-2.511*	0.554
	(3.734)	(2.760)	(1.624)	(3.144)	(1.203)	(1.625)
girl (=1)	5.174	2.000	0.399	-0.647	-0.142	2.365
	(3.566)	(2.370)	(1.240)	(1.604)	(1.548)	(1.793)
age (in years)	-0.978*	-0.794	-0.380	-0.586	-	-
	(0.584)	(1.235)	(0.966)	(1.310)		
sisschool	-	-	0.294	0.460	-	-
			(1.930)	(1.894)		
order32	-	-	-1.550	-0.293	-0.129	-
			(1.527)	(1.352)	(1.388)	
secondtask	-	-	0.578	0.663	-	-
			(1.534)	(1.667)		
parenteducation	-1.025	-0.991	-2.881	-0.804	-	-0.164
	(3.189)	(2.378)	(2.945)	(2.550)		(1.655)
parentforeign	-	-1.445	0.362	-	-	-
		(2.365)	(2.035)			
allowance	-	-	-	-	-0.002	-
					(0.007)	
extraactivity	-	-	-	-	-4.920	-
					(973.499)	
householdsize	-0.131	-	-	-	-	-
	(2.063)					
dominant	1.588	0.794	-	-	-	1.606
	(1.230)	(1.539)				(1.302)
assertive	-	1.487	-	-0.683	0.060	1.597
		(2.419)		(1.414)	(1.295)	(1.786)
confident	-	-0.503	-	-	1.759	-0.703
		(3.064)			(1.133)	(1.590)
adultinteraction	1.500	-0.178	-	-	-	0.343
	(1.266)	(0.948)				(0.766)
blurts	-	-0.340	-0.545	-	-	0.447
		(1.899)	(1.015)			(1.250)
distracted	-	-	-	-1.467	-	-
				(1.513)		
interrupts	-	0.978	-	-	-	-
		(2.205)				
Constant	-1.261	2.242	7.717	15.998	1.144	-11.802
	(10.274)	(14.502)	(12.979)	(18.311)	(973.516)	(12.092)
Observations	15	15	15	15	15	15

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