There's Something About Ambiguity: Evidence from Halloween *

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Abstract

We conducted an ambiguity aversion experiment with children on Halloween during trick-or-treating and correlated this with their choice of costume. We find that children wearing the most commonly chosen costumes are more likely to avoid a gamble with ambiguous odds. This inquiry is in line with a series of recent papers observing whether choices in simple experimental economics games correlate with theoretically similar non-laboratory behavior.

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1 Motivation and Existing Literature

Ellsberg (1961) argued, and others confirmed,[1] that some individuals are ambiguity averse – they do not like situations where probabilities are vague or unknown. This simple observation may have important economic implications. Knight (1921) and Bewley (1989) argued that it is the key to understanding entrepreneurism; Mukerji (1998) showed that ambiguity aversion provides an explanation of incompleteness of contractual form.

We conjecture that ambiguity aversion leads to more conservative behavior. In the context of costume choice, we argue that choosing a common costume is likely to lead to a relatively stable social payoff, but that the social payoff to choosing a less common costume may be ambiguous. For example, coming to Halloween dressed as a "lawn" could lead to social approval or approbation. The probability with which each of these outcomes occurs is unlikely to be known to children and ambiguity averse agents will therefore avoid uncommon costumes. In a more economically familiar environment, for example portfolio choice, the same conservatism may lead to stickiness around the endowment point and a lack of trade in line with the classic results in Dow and Werlang (1992).

2 Experimental Design

2.1 Halloween 2007

The candy ambiguity aversion game mirrors Ellsberg's famous two urn experiment. The game provides a measure of ambiguity aversion and is easy to explain to young children and easy to implement. We set up a table on the front porch

[1] See Camerer and Weber (1992) and the references there in.

with two bowls on it, and greeted children as they came to trick-or-treat. The game administrator told each child that she could win either a large candy bar or a small candy bar by playing a game. The child was asked, "Which color do you like more, red or blue?" The administrator explained that she would blindly pull either a red or blue die out of one of the two bowls and that if the child's chosen color was pulled she would win a large candy. The only difference between the bowls was simple: the "ambiguous" bowl had a towel over it so that the children could not see the probability of success (the "true" probability, unknown to the child, was 50%) whereas the "known probability" bowl did not have a towel over it (and the probability was always set such that the child had a 33% chance of winning the large candy).[2] The child then chose a bowl and the administrator held her hand across her eyes and blindly chose a die from the child's chosen bowl. Another researcher stood behind the administrator and recorded the choice of the child, whether the child won the large candy, the costume characteristics, and the gender and approximate age of the child. In 2007, between the hours of 6pm and 9pm, a total of 221 subjects participated in the ambiguity aversion experiment.

2.2 Halloween 2008

In 2008 our Halloween experiments also tested some theories in political economy,[3], and thus we decided to simplify the ambiguity aversion experimental protocol. Rather than implementing the Ellsberg urn example, children were simply given the choice between a clear bag of candy, the contents of which were easily determined, and an opaque bag of candy, the contents of which the children

[2]The dice were added to the "known probability" bowl after the child had chosen his or her preferred color. The content of the "ambiguous" bowl was never changed.

[3]See Allen et al. (2008) for details.

were not able to discern.[4] Again, costume and demographic characteristics were recorded about each child. In 2008 a total of 551 children participated in the experiment. Table 1 provides summary statistics for the data.

We interpret the child choosing the clear bag as being ambiguity averse. There may be several difficulties with this interpretation. First, it is possible for each child to place a prior on the content of the brown paper bag such that the clear bag is strictly preferred. Thus we do not capture the full strength of Ellsberg's paradox. Second, our measure may be confounded with the extent to which the child trusts the experimenter. Third, there may be intrinsic characteristics of clear and brown bags that lead children to strictly prefer one over the other independently of ambiguity; children might be attracted to the colors of the candy inside the bag relative to dull brown, or children might prefer brown bags because they can be burst. While we accept that these are limitations of the experiment, there are reasons to believe that none of these is too severe. First, it seems natural for the child to apply the principle of insufficient reason and assume that the brown paper bag contains about the same amount of candy as the clear bag. Second, it is not clear which bag the child should choose if he or she does not trust the enumerator. Third, our results will only be invalid if those children who like common costumes also have an intrinsic preference for clear bags; while this is possible under the explanation that children with uncommon costumers particularly enjoy bursting brown bags, we do not believe it is an obviously compelling story. Finally, as we are able to replicate the results from 2007 where we used covered and uncovered bowls instead of brown and clear bags, we are reasonably confident that we are measuring the same thing across the two experiments.

[4]We worked hard to ensure that the bags were of similar volume.

3 Data

We first examine the distribution of costume choice.[5] Histograms for the number of costumes in each year, broken down by gender, are given in figure 1. We made no ex-post attempt to group costumes on any dimension. The three most common female costumes in 2007 were princess (12)[6], witch (8) and cat (8), while the three most common male costumes in 2007 were Spiderman (7), Superman (4) Power Ranger (3) and pirate (3). In 2008, the three most common female costumes were witch (34), fairy (20) and princess (15), while the three most common male costumes were skeleton (11), ghoul (10) and batman (6) and ninja (6). The histograms show that these costume choices were substantially more popular than other choices, although this effect is more pronounced for girls. A significant portion of costumes were chosen by only one child.[7]

4 Results

Table 2 presents the results of probit and ordinary least squares (OLS) estimation on the likelihood of choosing the ambiguous option in the bowl choice experiment. Column (1) presents the results of a probit estimation. All results are reported in marginal effects. All of the regressions include controls for age and gender. In Column (1) the sample includes male and female trick-or-treaters from

[5]We recognize the possibility, particularly amongst younger children, that their parents chose their costume for them. However, we put forward the intuition that if parents did choose their child's costumes, they did so by choosing something they thought their child would like, and not by choosing something as a tool to alter their child's underlying preferences.

[6]The number in parentheses indicates the number of children wearing this costume. Princesses represent generic costumes that did not correspond to any specific character. When children's costumes represented specific characters, they were classified as such. For example, Snow White would have been classified as a distinct costume choice from princess.

[7]Some examples of unique costumes include: cow, skunk, trash can, race car, and a grassy lawn.

both the 2007 and 2008 experiments. In this column the dummy “Number 1 Costume” is set to 1 if the child wore the most popular costume (for his or her gender) in that year. The dummies “Number 2 Costume” and “Number 3 Costume” are set to 1 if the child wore the second or third most popular costume in the year they participated.

The coefficient on the “Number 1 Costume” suggests that a child wearing the most popular costume is 22.5 percentage points less likely to choose the ambiguous option. This is a substantial effect given that the base rate of choosing the ambiguous option was 68 percent. The coefficient on the “Number 2 Costume” dummy variable corroborates this further, with children wearing the second most popular costume being 16.6 percentage points less likely to choose the ambiguous costume. Both the effect for most popular, and second most popular costumes are statistically significant at conventional levels. The coefficient on “Number 3 Costume” is not significantly different from zero. The results from OLS estimation, presented in Column (2), are very similar.

5 Discussion and Conclusion

It is important to note that this study shows only a correlation between choice in an ambiguity aversion game and costume choice. While we argue that the correlation is consistent with a stylized model, the mechanism at work is not necessarily as we have described it. In particular, any personal characteristic that is correlated with both costume choice and choice in the candy game could drive our results. For example, one referee suggests that the correlation may reflect differences in imagination across the population. This seems a plausible alternative explanation.

Four likely sample selection issues are worth noting for their potential to affect the external validity of the study. First, non-curious children were more likely to avoid the home, given the unusually large quantity of children typically on the porch. Second, trick-or-treaters intent on maximizing productivity likely skipped the home, as it was effectively wage-reducing to play the games due to the wait time. Third, the neighborhood is within walking distance of Yale University, thus likely to be over-represented by children of highly educated parents (although children come to this neighborhood from other parts of New Haven that are not as highly educated). Fourth, choice of Halloween costumes may be fundamentally different from other domains in which ambiguity aversion is potentially important and thus whether these measures, constructed by choice over candy, are indicative of more deeply rooted preference parameters requires further research.

Table 1: Summary statistics

Sample	2007	2008
Variable	**Mean**	**Mean**
Chose Ambiguous	0.584	0.719
#1 Girl Costume	0.059	0.062
#2 Girl Costume	0.041	0.036
#3 Girl Costume	0.023	0.027
#1 Boy Costume	0.032	0.02
#2 Boy Costume	0.018	0.018
#3 Boy Costume	0.027	0.022
Age 0-3	0.027	0.031
Age 4-6	0.258	0.25
Age 7-9	0.339	0.303
Age 10-12	0.258	0.323
Age 13 and up	0.118	0.093
Missing Age	0	0.022
Male	0.416	0.490
N	221	551

Figure 1: Distribution of Costume Choice by Age and Year

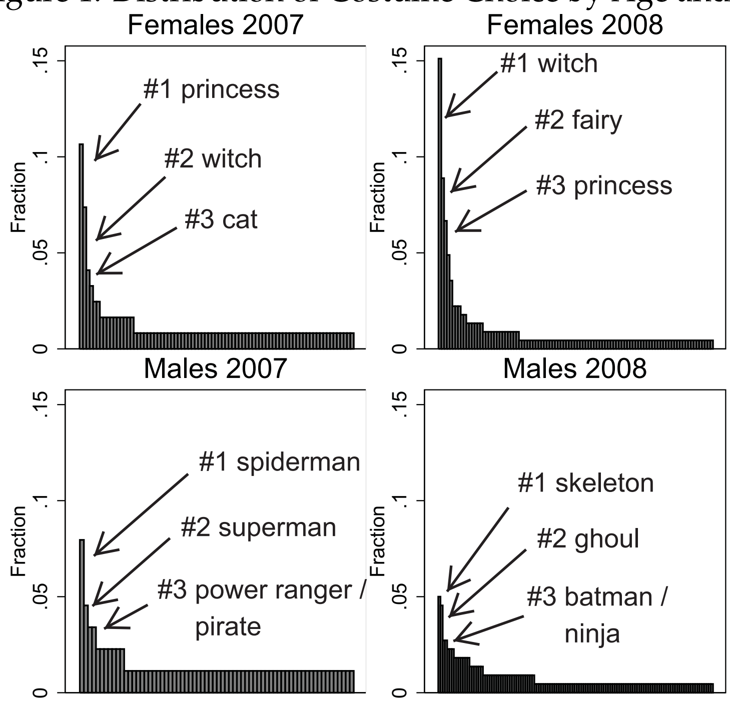

Table 2: Relationship between Common Costumes and Choices

	Probit	OLS
	(1)	(2)
Number 1 Costume	-0.23***	-0.22***
	[0.07]	[0.06]
Number 2 Costume	-0.17**	-0.16**
	[0.08]	[0.08]
Number 3 Costume	0.07	0.06
	[0.08]	[0.07]
Age 0 - 3	-0.06	-0.06
	[0.08]	[0.14]
Age 4 - 6	0.01	0.01
	[0.06]	[0.06]
Age 7 - 9	-0.01	-0.01
	[0.06]	[0.06]
Age 10 - 13	0.04	0.04
	[0.06]	[0.06]
Missing Age	0.24	0.25
	[0.10]	[0.15]
Male	0.01	0.01
	[0.04]	[0.03]
2008 Sample	0.13***	0.12***
	[0.04]	[0.04]
Constant		0.60***
		0.06
Observations	772	772
Mean of dependent variable	0.680	0.680

Notes: Robust standard errors in brackets. * significant at 10 percent, ** significant at 5 percent; *** significant at 1 percent. Coefficients in Column (1) represent marginal effects. The dependent variable equals 1 if the child chose the ambiguous option and 0 otherwise.

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