Paper submitted to the joint conference of the IAREP / SABE / ICABEEP: Exeter, UK, 12th-16th July, 2011.

Love Thy Neighbour: Proxemic bias in the voting strategy of contestants in the TV quiz-show 'The Weakest Link'

Paul Goddard, Rebecca Ashley, Gareth Fuller and Ian Hudson.

School of Psychology, University of Lincoln, Lincoln, UK, LN6 7TS.

Email: *pgoddard@lincoln.ac.uk*

Word Count: 2090

Abstract

We observed the pattern of voting in the first round of 72 episodes of the UK version of the TV quiz-show 'The Weakest Link' (WL). The first round culminated as each of the nine contestants carried out an eight-alternative-forced-choice task by voting for one of their peers as the WL. Rudimentary probability theory was used to generate the frequencies of votes that would be expected purely due to chance for all eight relative positions of voter-to-candidate spatial relationships. The observed frequencies from the episodes were then compared to the expected pattern. Consensus, the number of contestants voting for the eventual WL, was also recorded in each of the 72 first rounds. Two main findings emerged:- i.) contestants avoided voting their direct neighbour as the WL, although the propensity to vote for a peer was not a simple function of distance per se; ii.) the 'neighbour-avoidance' effect increased as the group consensus as to the identity of the WL decreased.

Introduction

Observational field studies based on television quiz-shows are free from the kinds of demand characteristics and ethical concerns that can sometimes blight experimental work. Further, they are effectively double-blind, so providing a useful empirical test-bed for theories in social psychology, decision making and economics. For example, the popular TV quiz-show *The Weakest Link* (*WL*) has already been used to assess the optimal banking strategy in an analysis of economic decision making (Haan, Los and Riyanto, in press), as a test of gender and race discrimination in voting practice (Antonovics, Arcidiacono & Walsh, 2005) and to investigate the trade off between risk and return strategies in game playing (Barmish & Boston, 2009). We used a similar procedure to measure the voting behaviour of contestants as a function of the proximity of the voter to the candidate voted for.

The spatial relationships between actors in social situations have a profound impact on their subsequent social behaviour. For instance, there is a clear link between the proximity of the 'learner', 'teacher' and authoritarian 'experimenter' in Milgram's classic obedience paradigm and the level of obedience elicited in the 'teacher'.

Initially, obedience was at its greatest when the' teacher' was spatially remote from the 'learner'. Issuing instructions from a separate room seemed to make it easier for the 'teacher' to administer punishment, but, in replications where the 'learner' could be seen by the 'teacher', obedience reduced until it almost disappeared when the 'teacher' was instructed to physically place the 'learner's' arm onto an electric plate in order to receive the punishment of an electric shock. Similarly, the 'teacher's' level of obedience to authority diminished as the distance between the 'teacher' and the authority figure of the 'experimenter' increased (Milgram, 1974).

We made two simple predictions about how spatial proximity could influence decision making. The configuration of contestants in the WL makes it easy to define the spatial relationship between all contestants, moreover each contestant is forced to make a discrete decision at the end of the first round of questions by voting for one of their peers. It follows that if the contestants are influenced by the spatial proximity of their fellows then we should expect voting frequency to vary as some function of spatial proximity. Firstly, we predicted an inverse relationship between frequency and proximity; contestants will be less likely to vote for their close neighbours so more likely to vote for those further away. Secondly, we expect that this relationship will become more pronounced as the consensus regarding the identity of the WL decreases.

Method

Rules of the Game

Nine contestants were arranged in a semi circle (A-I) about a central host. Round one began when the first contestant alphabetically fielded the opening question. The first correct answer started a link in a prize-chain that began at zero and reached an upper ceiling of £1000 in nine turns. An incorrect answer broke the prize-chain and the money was lost although contestants had the option to terminate the prize-chain by saying "bank" at the beginning of their turn that ensured the accrued value of the prize-chain was transferred to a secure prize-fund with the prize-chain reset to zero. Questions were dealt sequentially in a clockwise direction such that when the contestant occupying position **I** fielded their question the sequence wrapped round to **A** again. This cycle of questions continued for two minutes unless terminated because a ceiling of £1000 had been accumulated in the prize-fund. The round culminated as each of the nine contestants made an eight-alternative-forced-choice blind vote for one fellow contestant that they considered to be the 'weakest' contestant. The contestant that received the most votes was deemed the 'weakest link' for that round and eliminated from the game. Ties were decided by the contestant that was the 'strongest link'. This procedure continued round by round until two contestants remained to contest a head-to-head decider. The eventual winner received the sum of the prize-fund accumulated over the previous rounds.

Field observation

The position and gender of each contestant was noted as was the contestant that they voted for as the WL at the end of round one. No other personal details of the contestants were recorded. Celebrity episodes were not included. Expected voting frequencies were derived by recourse to rudimentary probability theory. By assuming a random unbiased model then the probability associated with a contestant voting for any of the other eight contestants was always $^1/_8$ (0.125). As the contestants at the endpoints of the array, **A** and **I,** were not considered as spatial neighbours (even though they are strictly temporal neighbours in the sequence of questions) meant that they only had one direct neighbour each, whereas contestants **B** through **H** had two each. Therefore, the expected frequency for contestants voting for their neighbour in a single round was 2, simply the sum of the probabilities of individual contestants voting for their neighbour (2*0.125 + 7*0.25). Expected frequencies were calculated for all spatial relationships, neighbour, neighbour +1, ..., neighbour + 7, giving, 2, 1.75, 1.5, 1.25, 1, .75, .5, .25 respectively. Notice that these sum to nine, the same as the number of contestant votes in a single round. Over the course of 72 episodes the expected number of neighbour votes was 144.

Results and discussion

The results are presented in two parts reflecting our two main analyses, i.) voter-candidate proximity: the 'neighbour-avoidance' effect, and ii.) the effect of consensus.

i.) voter-candidate proximity: the 'neighbour-avoidance' effect

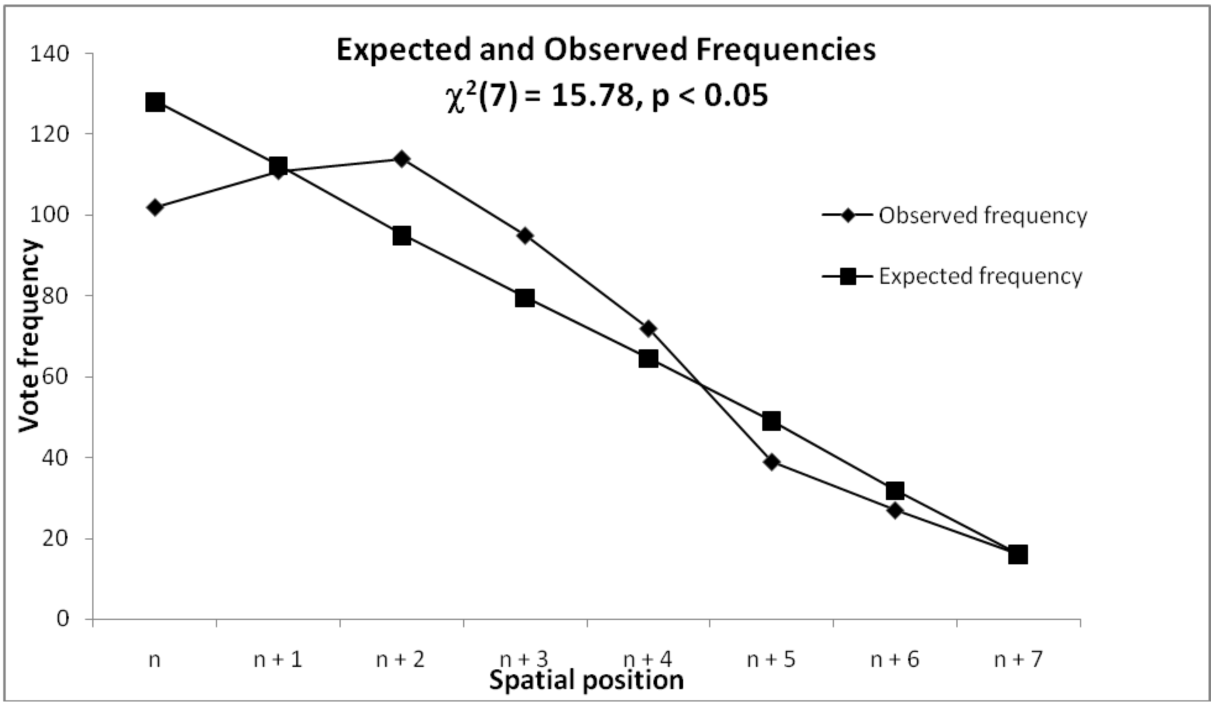

Figure 1. compares the expected voting frequency (squares), derived as the unbiased pattern of voting, with the observed pattern of voting (diamonds). Voting frequency is plotted as a function of the spatial relationship between voter and candidate where 'n' refers to the voter's neighbour and 'n + 1' the next-door-but-one neighbour and so on. (The data shown here excludes the votes cast by the eventual WL)

If implicit processes operated to influence decision-making then they should become apparent as systematic biases over the course of many decisions. In the context of the WL, decisions were the votes cast measured as a function of the spatial relationship between the voter and the candidate. Significant departures between the unbiased pattern of voting and the observed pattern of voting can be seen above in Figure 1 where contestants were less likely to vote for their direct neighbour 'n'. Although this supports the predicted avoidance of voting for neighbours Figure 1 also shows that there was not a simple linear relationship between voting pattern and proximity as more distant candidates were not necessarily more likely to acquire votes. A comparison between voters' 'neighbour votes' against 'non-neighbour votes' was significant ($\chi^2(1) = 7.508$, $p < .005$).

ii.) the effect of consensus

Consensus refers to the number of votes accrued by the eventual WL. We make the assumption that in a round where all eight contestants (aside from the WL themselves) vote for the same candidate then there is some degree of certainty over the identity of the weakest candidate. Likewise, low consensus rounds are indicative of uncertainty. Proximity biases are more likely to prevail in circumstances of uncertainty therefore we expect the neighbour-avoidance effect described above to increase with a decrease in consensus. Table 2 below shows the distribution of consensus across the 72 episodes.

Consensus	*Frequency*
1	0
2	1
3	12
4	16
5	17
6	11
7	12
8	3

Table 1. shows the frequency distribution of episodes (n=72) by consensus, the number of votes cast for the eventual WL, during the first round of voting.

The effect of consensus is shown in Figure 2. The leftmost points for 'all (72)' replicate the data already presented in Figure 1. χ^2 values associated with the proximity effect are shown moving rightwards by progressively stripping away higher consensus episodes. For example, the three episodes with the highest consensus, where all eight contestants vote for the WL, are taken away from the analysis for '-8 (69)'. As more high consensus episodes, -7 & -6, are taken away notice that proximity effect increases as indicated by the increase in the χ^2 value. This supports our second prediction that spatial proximity, and in particular the neighbour-avoidance effect, increases with decreasing consensus.

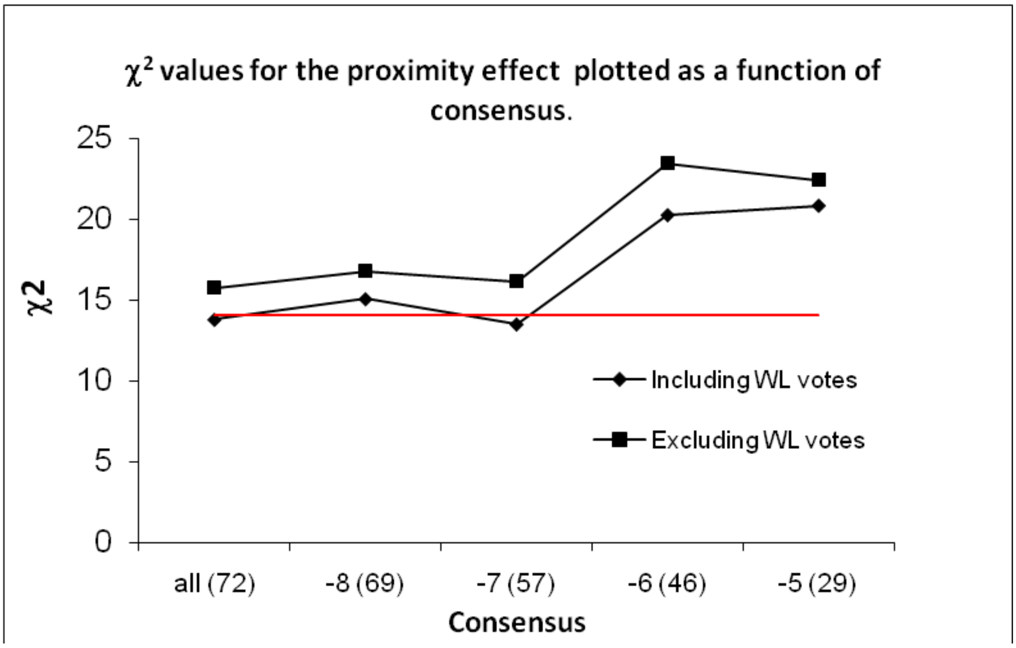

Figure 2 plots the χ^2 *values for the proximity effect with the highest consensus episodes gradually removed. The proximity effect is shown both for the episodes incorporating the votes made by the WL and excluding the WL. The red line represents the critical value for* $\chi^2(7)$ *above which p < .05, two-tailed.*

There was no systematic bias in the spatial or temporal order of candidates as the observed frequencies (f_0) of the WL found in each spatial position (**A**-**I**) compared to the expected frequency (f_e) of 8 (n(episodes)/n(positions); 72/9=8) was non-significant ($\chi^2(8) = 12.75$, p = ns). Contestants were no more or less likely to vote for candidates that preceded or followed them temporally in the testing sequence.

Discussion

Our findings support our second prediction and our first prediction in part. The main finding is that contestants show a strong avoidance for voting for their direct neighbours, however, voting is not a simple function of the spatial distance between the voter and the candidate. As the consensus regarding the WL reduces then the neighbour-avoidance in the contestants' voting increases.

We suggest that contestants made their voting decision based on the availability of two very different sources of information. Firstly, the *game-specific* and primary source of information was public, explicit and encompassed the observable performance of the contestants during the round of questions. When the integrity of this source of information was high and unambiguous, contestants faced an easy and reliable decision identifying the weakest performer. In these rounds there was high consensus over the identity of the *WL*. On the other hand, in rounds when *game-specific* information was equivocal, for example all candidates answered all questions correctly, then voters were in a quandary and had to rely instead on secondary *subject-dependent* sources of information. This *subject-dependent* source was private, implicit and encompassed each voter's individual subjective dependent attributions. In these rounds, group consensus over the identity of the *WL* was lower because decision making shifted away from the primary high fidelity source of *game-specific* information to the secondary *subject-dependent* source, more prone to biases like ‘neighbour-avoidance’. We conclude that the format of TV quiz-shows provides an ideal context to examine forced-choice decision making and the biases thereof.

Acknowledgements

RA was supported by an ‘Undergraduate Research Opportunities Scheme (UROS) 2009’award from the University of Lincoln to code data and generate expected frequencies. GF and IH were third year undergraduates working on proximity and gender respectively and contributing to this project under the ‘Student as Producer’ initiative at the University of Lincoln. Thanks go to previous undergraduates for assistance with coding and Alan Woodford, George Rodis and Steve Wilson for technical support, and Rob Gilfoyle, Barry Hallam and Pete Mennell for AV support.

References

Antonovics, K., Arcidiacono, P., & Walsh, R. (2005). Games and discrimination: Lessons from ‘The Weakest Link’. *Journal of Human Resources*, 40(4), 918-947.

Barmish**,** R.B., & Boston, N. (2009). Risk and Return Considerations in ‘The Weakest Link’. *American Mathematical Monthly*, 116(4), 305-315.

Haan, M., Los, B., & Riyanto, Y. (in press). Signalling strength? An analysis of economic decision making in ‘The Weakest Link’ *Theory and Decision*.

Milgram, S. (1974). *Obedience to Authority: An Experimental View*. New York: Harper and Row.