

# ON THE EFFICIENCY OF AC/DC: BON SCOTT VERSUS BRIAN JOHNSON

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*We use tools from experimental economics to address the age-old debate regarding who was a better singer in the band AC/DC. Our results suggest that (using wealth maximization as a measure of “better”) listening to Brian Johnson (relative to listening to Bon Scott) resulted in “better” outcomes in an ultimatum game. These results may have important implications for settling drunken music debates and environmental design issues in organizations. (JEL C7, C9, D6, Z1)*

## I. INTRODUCTION

The band AC/DC is considered one of the most influential hard rock bands, often compared to Led Zeppelin and Black Sabbath in influencing many subsequent hard rock and heavy metal bands. Indeed Christie (2003) argues that AC/DC was a “key common denominator” in the new wave of heavy metal emerging from Britain in the 1970s and influencing all genres of rock & roll through the 1980s and 1990s. The band was formed in 1973 by Angus and Malcolm Young, who took the band’s moniker from the back of their sister’s sewing machine. In its 35-yr history, the band has sold more than 150 million albums, including 42 million copies of the 1980 album *Back in Black*, making *Back in Black* the highest selling album by any rock band. Of the 19 albums the band released, Eddy (1991) classifies eight of these albums in the top 500 heavy metal albums in the universe and in 2003 the band was inducted into the Rock & Roll Hall of Fame. Given all this, it is no wonder that AC/DC has such a rabid fan base and, as discussed below, faces an epic debate regarding its line up.

Among musicologists, researchers of popular culture, and rock and roll lovers of all ages

there exists a common debate. That is, with respect to the rock band AC/DC, who is the better vocalist: Bon Scott or Brian Johnson? The band’s original vocalist, Scott, performed on seven of the band’s albums (excluding live albums and compilations) before dying in 1980. Brian Johnson joined the band in 1980, serving as vocalist on nine albums (excluding live albums and compilations). Since 1980, there has been near constant contention regarding who was the better singer.<sup>1</sup>

In this paper, we explore this issue. Since it is difficult to ascertain which vocalist was better given the heterogeneity of musical tastes, our analysis does not focus on the aural or sonic quality of the vocalists’ performances. Rather, using tools from the field of experimental economics, we consider which vocalist results in individuals arriving at more efficient outcomes in a simple bargaining game. Our results suggest that having participants listen to songs by AC/DC in which Brian Johnson served as vocalist results in participants realizing more efficient outcomes. Thus, in terms of a singer’s ability to implement efficient behavioral outcomes among listeners, our results suggest that Brian Johnson was a better vocalist than Bon Scott.<sup>2</sup>

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1. Masino (2007) and Walker (2001) document (and fall on opposite sides) of this debate.

2. Our research also follows important research conducted by Blinder (1974) on oral hygiene, McAfee (1983) on the invincibility of America, and Snower (1982) on the role of the undead in macroeconomic policy making.

### ABBREVIATION

MAO: Minimum Acceptable Offer

By focusing on the effects of music on outcomes, our research follows previous research in physiology, psychology, and sociology. For example, Bernardi, Porta, and Sleight (2006) document how different styles of music can induce cardiovascular, respiratory, and cerebrovascular changes in listeners. In psychology, Lesuik (2005) has documented how the use of music in the workplace can result in positive mood changes and enhanced productivity. Finally, Bryson (1996) has demonstrated how music (particularly heavy metal) can contribute to reinforcing symbolic boundaries between individuals and Stack and Gundlach (1992) have documented how listening to country music increases the incidence of suicide.

## II. EXPERIMENTAL DESIGN

In our experiment we utilize a common procedure from experimental economics entitled the ultimatum game (see Roth, 1995). In this game, individuals are randomly paired and assigned the roles of either proposer or responder. Proposers are allocated a sum of money from which they must choose an amount to extend as an offer to the responder. The responder, upon learning of this offer, can either accept or reject the offer. If she accepts the offer, the responder receives the offer (in cash), and the proposer is given the original sum of money less the offer. If the offer is rejected, both participants receive nothing.

Under the assumption that individuals have preferences over only their own wealth, the predicted game theoretic outcome (the subgame-perfect Nash equilibrium) is that in which the proposer extends the smallest possible offer and the responder (weakly) accepts any offer greater than (or equal to) zero. Such an outcome is efficient in the sense that no resources are lost in the bargaining process (i.e., the resources are not lost via a decision to reject the offer). However, experiments have shown that proposers typically offer between 20% and 50% of the wealth available in the experiment and responders, on average, reject offers below 30% (see Camerer 2003). These results suggest that individuals not only value their own wealth, but also the wealth of others and the fairness of an allocation. This has fostered new models of economic behavior incorporating inequity aversion, cooperation, and reciprocity (e.g., Bolton and Ockenfels

2000; Charness and Rabin 2002; Fehr and Schmidt 1999).

In our experiment, participants were paired and told the structure of the game. Each pair was endowed with \$10 to use in the game (i.e., \$10 from which the proposer must choose an offer to extend the responder) and offers were restricted to integer values (i.e., whole dollars). Prior to learning his or her role as proposer or responder, each participant provided the offer they would extend were they assigned the role of proposer and, for each possible offer (i.e., for each offer between \$0 and \$10), whether they would accept or reject the offer were they assigned the role of responder. After all individuals had provided this information, the roles of proposer and responder were randomly assigned within each pair and the indicated offer (from the proposer) and the respective accept/reject decision (from the responder) were implemented.<sup>3</sup> The corresponding payoffs were paid in cash to each participant.

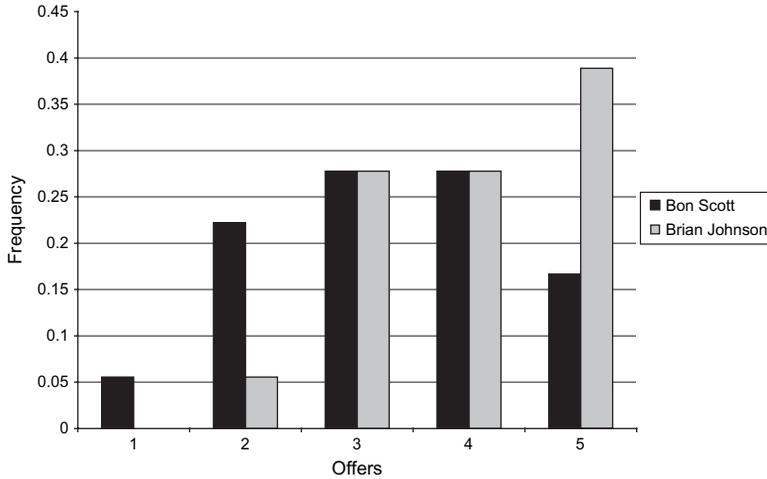
Our treatment variable in the experiment was the type of music played while individuals made decisions. As demonstrated by Bernardi, Porta, and Sleight (2006), different musical styles can have different physiological effects in individuals. These effects, along with emotional responses, may result in different patterns of decision-making regarding distributing money between oneself and another. In our Bon Scott treatment, participants listened to "It's a Long Way to the Top" (featuring Bon Scott on vocals) from the album *High Voltage* (AC/DC 1976). In our Brian Johnson treatment, participants listened to "Shoot to Thrill" (featuring Brian Johnson on vocals) from the album *Back in Black* (AC/DC 1980). These songs were chosen in order to avoid preconceived preferences for the band's most popular singles (e.g., "Highway to Hell," "You Shook Me All Night Long").<sup>4</sup>

3. Oxoby and McLeish (2004) demonstrate that this manner of elicitation yields results that are indistinguishable from assigning roles prior to eliciting decisions.

4. In a similar research design, Kirchsteiger, Rigotti, and Rustichini (2006) used films (Spielberg's *Schindler's List* and Chaplin's *City Lights*) to induce mood in subjects playing a gift-giving game. Their results suggest that watching *Schindler's List* yields greater reciprocity while watching *City Lights* yields greater generosity.

FIGURE 1

The distributions of offers in the Bon Scott and Brian Johnson treatments



### III. RESULTS

A total of 36 participants from a large Canadian university took part in the experiment (two sessions of 18 individuals each). In one session, “It’s a Long Way to the Top” was played while participants made their decisions; in the other session “Shoot to Thrill” was played while participants made their decisions. To maintain anonymity among subjects and bargaining pairs, participant pairings were made by computer and decisions were entered via computers located in separated experimental stations.<sup>5</sup>

To analyze the results, we compared the offers extended by participants across each treatment. For each participant we also calculated their minimum acceptable offer (MAO; the lowest offer a participant would accept) and compared these across treatments. Note that in any participant pair, an efficient outcome (i.e., an offer that was not rejected) was more likely in the presence of a higher offer and a lower MAO.

When the music of Bon Scott was played, participants extended offers with mean (standard deviation) of 3.28 (1.18) whereas participants in the Brian Johnson treatment extended offers with mean (standard deviation) of 4.00 (0.97). The distributions of offers in each treat-

ment are presented in Figure 1. Using nonparametric Wilcoxon rank-sum tests, we can reject the hypothesis that the distribution of offers across treatments are the same ( $p = .064$ ).

In terms of MAOs, participants in the Bon Scott treatment had minimum acceptable offers with mean (standard deviation) of 3.94 (0.87) while participants in the Brian Johnson treatment had minimum acceptable offers with mean (standard deviation) of 3.17 (1.25). The distributions of MAOs are presented in Figure 2. Again, using nonparametric Wilcoxon rank-sum tests, we can reject the hypothesis that the distribution of MAOs in each treatment are the same ( $p = .050$ ). Thus, offers were lower and MAOs were higher when participants heard the music of Bon Scott. This suggests that more offers would be rejected when listening to Bon Scott than when listening to Brian Johnson.<sup>6</sup>

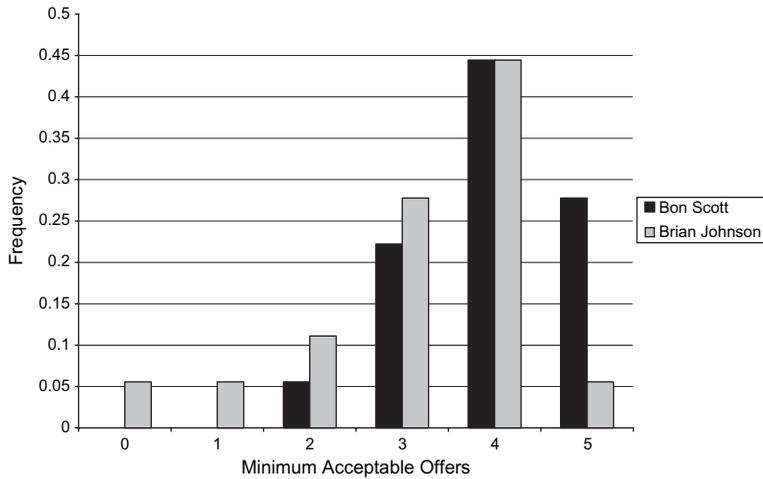
In terms of the actual number of pairs in which offers were rejected, we observed five rejections (four acceptances) in the Bon Scott

5. The experiments were programmed using the software by Fischbacher (2007).

6. We considered extending this research to shed light on the Van Halen debate. Unfortunately, we were unable to obtain ethics clearance to play Gary Cherone in our lab. While we attempted to restrict our analysis to the comparison of Van Halen vocalists David Lee Roth and Sammy Hagar, a research assistant thought we were exploring the Roth/Hagar debate and played Sammy Hagar’s “Why Can’t This Be Love” along with a pre-recorded lecture by noted economist Al Roth. The results from this experiment are obvious and not discussed here.

FIGURE 2

The distributions of MAOs in the Bon Scott and Brian Johnson treatments



treatment as opposed to three rejections (six acceptances) in the Brian Johnson treatment. As suggested by our analysis above, we observed a higher rate of rejection and hence less efficient outcomes when the music of Bon Scott was played during participants' decision making. It is interesting to note that 14 of 16 participants in the Brian Johnson treatment would have accepted their own offers (i.e., their offers were greater than or equal to their MAO). On the other hand, only 50% of participants in the Bon Scott treatment would have accepted their own offer. It is natural to consider this type of "internal" consistency (accepting one's own offer) as an aspect of rationality or proper understanding of the dynamic structure of the game. Thus our analysis potentially sheds light on the cognitive states and cognitive costs that are induced by listening to Brian Johnson and Bon Scott. We leave this for future research.

#### IV. CONCLUSIONS

The question as to who was a better singer, Bon Scott or Brian Johnson, may never truly be resolved. However, our analysis suggests that in terms of affecting efficient decision-

making among listeners, Brian Johnson was a better singer. In addition to helping settle many barroom debates, our analysis has direct implications for policy and organizational design: when policy makers or employers are engaging in negotiations (or setting up environments in which other parties will negotiate) and are interested in playing the music of AC/DC, they should choose from the band's Brian Johnson era discography.<sup>7</sup>

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7. A secondary implication of this research is on the role of the internet in information dissemination. See Wright and Jinman (2007).

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