

The influence of the boxing stance on performance in professional boxers

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ABSTRACT: In boxing, athletes choose between two strategies: the orthodox stance characteristic of right handed competitors, or the southpaw stance characteristic of left-handers. Despite a conviction popular among the practitioners of this sport that fighting against a southpaw opponent constitutes a handicap, the effectiveness of the type of stance has so far not been examined. We extracted the statistics of the top twenty active male professionals boxing in each of the seventeen weight divisions. Out of the 340 boxers who composed our group, 75% used the orthodox stance and 25% were southpaw. Generally, we found that boxing stance had no effect on the percentage of 340 top professional boxers' victories. However, both the southpaw and the orthodox athletes had a higher percentage of victories against orthodox boxers than against southpaws.

KEY WORDS: professional boxing, boxing performance, boxing stance, handedness, orthodox, southpaw

Introduction

The phenomenon of handedness in humans, in addition to having a large popular appeal, has generated an extensive academic literature. A considerable number of studies in this area concern combat sports (Grouios et al. 2000; Raymond et al. 1996). While right-handers clearly dominate in human populations (Raymond and Pontier 2004), the proportion of left-handers among professional ath-

letes is clearly higher than the 10 to 13% characteristic of the general population (Raymond et al. 1996). Left handers are most overrepresented in combat sports, such as boxing (Gursoy 2008), judo (Mikheev et al. 2002), or wrestling (Ziyagil et al. 2010). What is more, an unusually high percentage of left-handed competitors seems to characterise sport disciplines involving direct interaction with an opponent, such as tennis, fencing (Harris 2010; Wood and Aggleton 1989),

cricket (Brooks 2004), baseball (Goldstein and Young 1996; Grondin et al. 1999), table tennis (Wood and Aggleton 1989), or football (McMorris and Colenso 1996). For example, of the participants in a variety of championship-level competitions, 34% of top tennis players (Holtzen 2000), 47% of top cricket players (Brooks et al. 2004), and 35% of top fencers (Aze-mar et al. 1983) were left handed.

How to account for the occurrence of left-handedness in the general population as well as among athletes? One existing explanation is the *fighting hypothesis* (Raymond et al. 1996), on which left-handedness is selected for because of an advantage it confers in close quarters combat. Hence, a popular evolutionary explanation for this phenomenon in sport is the *negative frequency-dependent selection hypothesis* (Raymond et al. 1996), which posits that left handed competitors benefit from using movements, techniques and tactics to which their opponents are not accustomed. For example, offensive actions executed by left-handers are markedly more difficult to predict than those of right-handers in sports such as volleyball (Loffing et al. 2011), tennis (Hagemann 2009) or football (McMorris and Colenso 1996).

Alternatively, the left-handers' advantage can be explained in terms of the *innate superiority hypothesis* proposed by Geschwind and Galaburda (1985), whereby left-handed individuals differ from right-handers in important neurological aspects. Left-handers, due to a larger right hemisphere of the brain, tend to have visual and spatial abilities better developed than the population average. For this reason, left-handers tend to have an advantage in tasks involving bimanual coordination, visual-spatial cognition or bilateral rapid reaction (An-

nett 1985). This would explain better performance of left-handed competitors in interactive sports, which rely on highly developed perceptual skills (Hageman 2009; Raymond and Pontier 2004; Brooks et al. 2004).

While numerous studies have targeted the phenomenon of left-handedness in humans in general, and in sportsmen in particular, it still remains unclear whether being left-handed constitutes an advantage in boxing. The fighting hypothesis and the innate superiority hypothesis referred to above would predict that left-handed boxers should perform better than their right-handed opponents. To our knowledge, only one study has so far been published directly testing the relation between handedness and success at boxing: Gursoy (2008) found that the ratio of defeats to victories was higher in right-handed than left-handed boxers. While this result provides interesting confirmatory evidence, his analyses have important limitations. Firstly, Gursoy's sample was rather small, consisting of results coming from only 22 boxers. Secondly, all of the boxers in the study were enrolled in the same boxing club (National Road Sport Men Boxing Club, Erzurum, Turkey). This could easily lead to bias, since a single very well performing left handed fighter in the sample, or a coach favouring left- or right-handers, would suffice to render those results unrepresentative.

An important complicating factor for analysing boxing bouts is the stance assumed by the boxers, which is likely of greater consequence than the inborn hand preference. Boxers adopt one of two available stances, mirror-images of each other: orthodox or southpaw. The term "orthodox stance" refers to the positioning of the boxer's hands and feet

with the left foot and left hand forward, and the right foot and right hand back – natural to a right-handed person. The term “southpaw”, natural to left-handers, refers to having one’s right foot and right hand in the front: a reverse (mirror image) of the orthodox stance. The choice of stance generally is a permanent characteristic. Very seldom, particularly skilled boxers such as Oscar de la Hoya or Floyd Mayweather, can switch between the stances flexibly within a single bout or round. However, each boxer has a preferred stance, which is usually determined by keeping the stronger hand in the back: this is so because the stronger hand is used for delivering power punches that require more space, whereas the weaker hand, kept in the front, is used for quicker jabs intended to keep the opponent at bay and break down his defences. This strategy is universally recommended by boxing experts (see: Onello 2007; Scott 2000; www.expertboxing.com; www.myboxingcoach.com; www.learnhowtobox.com).

In view of the above, we present a study aiming at determining how the choice of stance in boxing influences the outcome of the fight. This type of research question has its limitations, which we admit (for example, we do not directly address the influence of handedness on the outcome of boxing fights). On the other hand, such an analysis is valuable in making it possible to test our hypothesis on a very large sample of professional boxers; it also allows us to answer the question of whether the stance itself influences the outcomes of boxing bouts.

In sum, to date there have been no published studies on the influence of the stance on the outcome of fights in boxing. Although a study by Gursoy (2008) looked into how being left- or right-hand-

ed relates to boxing performance, it was conducted on a small sample of boxers and has other methodological limitations. This leads us to believe that testing how the boxing stance impacts boxing performance is valuable and will result in important insights.

Materials and methods

We used the internet database Boxrec (<http://boxrec.com/ratings.php>) to extract information on the stance and professional record for the top-rating male boxers in each of the seventeen weight divisions (heavyweight, cruiser, light heavyweight, super middleweight, middleweight, light middleweight, welterweight, light welterweight, lightweight, super featherweight, featherweight, super bantamweight, bantamweight, super flyweight, flyweight, light flyweight, minimumweight). Boxrec ratings are preferable to individual boxing federation rankings because of the former’s inclusiveness and objectivity: Boxrec stores information on all licensed bouts and uses this database to produce automatically generated rankings.

First, we collected the data for the total of 340 boxers: top 20 in each of the 17 weight divisions. We then inspected the boxers’ professional records, that is, for each of the boxers using the orthodox/southpaw stance we counted the number of victories/defeats/draws against an orthodox/southpaw opponent. If there was no data on the stance of the competitor in a particular bout, the result of that bout was not included into the analysis. The above body of data was collected in June 2013. We used it to calculate, for each boxer, the ratio of victories that boxer scored against orthodox and southpaw opponents.

We also conducted a second analysis in September 2014. We collected the data for the total of 2549 boxers for whom data on stance were available: top 150 in each of the 17 weight divisions (except for minimum weight, where data on stance were available for 149 boxers). We used these data to calculate whether better boxers are more often southpaw than worse boxers.

Results

Of the 340 boxers in the sample, 255 (75%) used the orthodox, and 85 (25%) – the southpaw stance. The boxers had, on average, 22.5 bouts in their record ($SD=10.07$), and won approximately 87% of them ($SD=12\%$). The stance had no effect on the ratio of victories in our sample of top 340 professional boxers

[the average ratio for orthodox boxers was 0.88 (88%), $SD=0.12$; the average ratio for southpaw boxers was 0.87 (87%), $SD=0.11$; $F_{1, 308}=0.13$, $p=0.71$, $\eta_p^2 < 0.01$].

The above analysis, however, does not take into account the stance of the antagonist, as it does not distinguish between the bouts fought against orthodox and southpaw opponents. To address this, in our next step we checked whether the victory ratio of boxers in our sample was different for orthodox versus southpaw opponents. The analysis showed that both the orthodox and the southpaw boxers had a higher victory ratio against their orthodox (0.89 on average, $SD=0.11$) than southpaw opponents (0.85 on average, $SD=0.21$); $F_{1, 308}=9.88$, $p < 0.002$, $\eta_p^2=.03$. Interestingly, there was no effect of own stance relative to

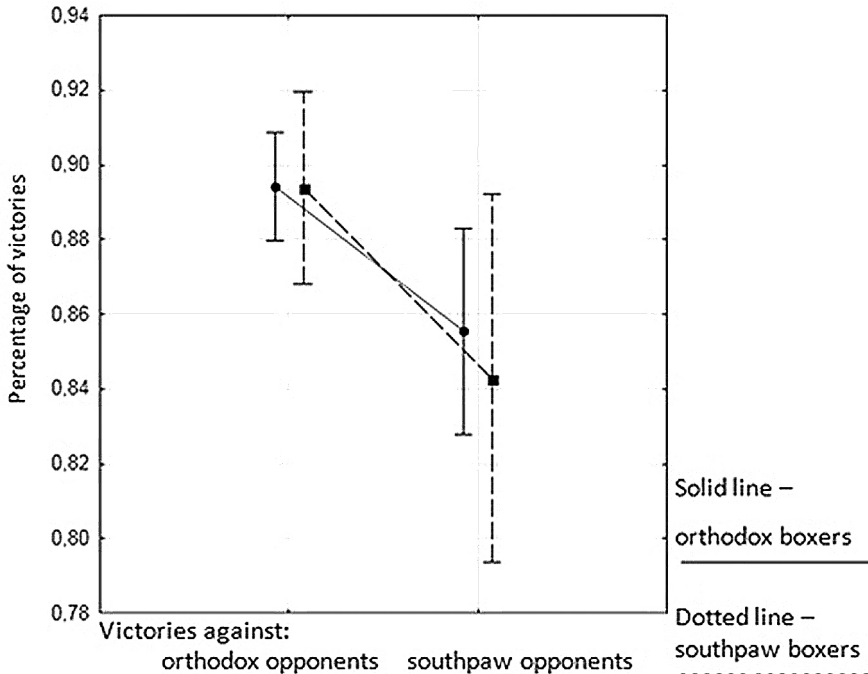


Fig. 1. Own stance, opponent's stance, and the percentage of wins in professional boxers

the stance of the opponent $F_{1,308}=0.19$, $p=0.66$, $\eta_p^2 < .01$ (Fig. 1).

Summing up, the southpaw boxers in our sample did not win more often than the orthodox ones. Nevertheless, the orthodox and southpaw boxers alike scored more victories when fighting against an orthodox opponent than a southpaw. Another statistical measure (χ^2 test) yielded the same pattern of results.

In the second analysis, we found that of the 2549 boxers included in the sample, 2027 (80%) used the orthodox, and 522 (20%) the southpaw stance. We also found that across all the analyzed divisions among:

- a) best rated 50 boxers this ratio was: 201 southpaw vs. 649 orthodox (24% southpaw);
- b) boxers rated from 51 to 100 position this ratio was: 167 southpaw vs. 683 orthodox (20% southpaw);
- c) boxer rated from 101 to 150 position this ratio was: 154 southpaw vs. 705 orthodox (18% southpaw).

The proportion of southpaw boxers was higher among better rated boxers than among worse rated boxers; $\chi^2=9.05$; $p=0.01$.

Discussion

Our analysis showed that 25% of the top 340 professional boxers (20 in each of the 17 weigh divisions) and 20% of the top 2549 professional boxers (150 in each of the 17 weigh divisions) fought in a southpaw stance. That figure is much higher than expected from the proportion of left-handers in the general population (10–13%; e.g. Raymond et al. 1996), suggesting that fighting in a southpaw stance natural to left-handers is conducive to better performance in boxing. Of course, it is possible that boxing schools

might preferentially draft left-handers, or that coaches may choose to convert their right-handed trainees to southpaws early in their boxing careers. It is important to note, however, that those explanations still turn on the assumption that being left-handed – or fighting in a southpaw stance characteristic of left-handers – constitutes an advantage in boxing. This is supported by our follow up analysis, which revealed that there were proportionally more southpaws among the higher ranking boxers than among lower ranking boxers.

The main purpose of this study was to examine how the boxing stance influences performance in boxing. Our analyses showed that in the sample of top professional boxers there was no significant difference between the victory ratio of orthodox and southpaw boxers. However, we also found that southpaw competitors scored a higher percentage of victories against orthodox than southpaw opponents. This apparent contradiction can be easily resolved. Since our sample consisted of the best active professional boxers, who only lost very rarely, we can expect a statistical phenomenon known as the ceiling effect to occur. The world's elite boxers all have a very high victory ratio (of almost 90% on average), with very limited scope for variation that could be accounted for by handedness or stance. Still, even for those boxers it was somewhat easier to win against an orthodox than a southpaw rival. As each of the boxers in our sample fought twenty or so bouts, it was possible that it was early in their careers.

The analyses performed in this study corroborate the results of Gursoy (2008), who found left-handers in his sample of boxers to perform better than right-handers. Our research, in addition to over-

coming some of the methodological problems of that study, also offers complementary data, since unlike Gursoy's (2008) sample consisting of amateurs and semi-pros, our sample comprised top professional boxers. In conclusion, it is likely that handedness – and the choice of stance based on handedness – plays a certain role in the amateur or early professional boxing career, but is not important for performance when competing on the top level.

Generally, our results support the evolutionary hypothesis on left handedness adaptiveness. As we discussed in the Introduction, previous studies suggested that left handedness increases fighting ability, because the opponent is not accustomed to his rival's movements and techniques (Raymond et al. 1996). Additionally, left handedness might be related with to elevated level of testosterone (Faurie et al. 2010). Furthermore, previous research clearly shows that the frequency-dependent advantage of left-handers may be interpreted in a wider context of human conflicts. For instance, the proportion of left handers positively correlates with the frequency of aggressive incidents, such as homicides (Faurie and Raymond 2005). Superior performance of left handed individuals should be therefore observed not only in cricket (Brooks 2004), table tennis (Wood and Aggleton 1989) or even mixed martial arts (Pollet et al. 2013; but see: Dochtermann et al. 2014), but particularly in boxing, as we showed in this study.

Authors' contributions

Idea of the study: PS SW AS Collected the data: PS, SW Analyzed the data: PS Wrote the paper: PS AS SW.

Conflict of interest

The Authors declare that there is no Conflict of interest.

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