

## **I Want to Watch this! An Evolutionary Perspective on the Popularity of Sports**

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### **Abstract**

There are many different sports, and some are more popular for watching than others. The present paper attempts to address the question why sports vary in popularity. To this end, an evolutionary framework is employed that indicates that sports have evolved to enable the reliable exchange of information of unobserved traits. Six of these traits are nominated, namely, physical strength, stamina, speed, dexterity, aggression and team spirit. On this basis, it is predicted that sports which require higher competence in these traits, and thus are better in transferring information on these dimensions, are more popular than sports which require less competence. Analysis on data based on 34 different sports supports this prediction. The implications of these findings are further discussed.

**Keywords:** popularity of sports, evolution of sports, cultural evolution of sports, honest signaling

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### **Introduction**

People exhibit a strong interest in watching sports, but it appears that this interest is stronger for certain sports and weaker for others (Gantz, Wang, Bryant, & Potter, 2006; Guttmann, 2004). That is - certain sports, such as football and basketball, are much more popular than others, such as golf and horse-riding. This raises the question why people prefer to watch some sports over others. The present paper aims to address this question that is, to investigate why sports vary in popularity.

More specifically, current evolutionary models indicate that sports evolved in order to enable individuals to communicate their unobserved abilities in a reliable fashion. Six of these traits that individuals are interested in signaling and observing through sports are nominated. It is argued that sports that are better in transferring reliable information on these traits score higher in popularity than sports which are less effective in doing so.

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## **The Evolution of Sports**

People doing sports and people watching sports is a pattern which appears to be present in almost all modern and ancient cultures (Guttman, 1986, 2004; Kyle, 2006). Participating in sports and watching sports requires devoting considerable resources such as energy, time, and money. In the evolutionary perspective, any predispositions for engaging in behaviors that are costly, without providing any survival or reproductive benefits, would be eliminated (Tooby & DeVore, 1987). Apparently, selection forces have not eliminated the inclination to do and watch sports, which suggests that these predispositions confer, or would have conferred to our ancestors, survival and/or reproductive benefits.

With regard to possible survival benefits, it has been argued that sports may have enabled individuals to build the skills necessary for activities such as warfare and hunting (Carroll, 2000; Chick, 1984, 2010). As hunting and warfare are physically demanding, those engaging in these activities would be better off if they did a physical preparation first. In this respect then, sports evolved to enable individuals to best prepare for the hunting and war effort (Carroll, 2000). Most scholars, however, argue that sports were favored by selection forces because of the reproductive advantages they conferred.

To begin with, it has been argued that sports are likely to function as culturally-invented courtship rituals that reliably advertise unobserved athletic abilities to the opposite sex (Miller, 2000; Zahavi & Zahavi, 1997). In particular, women divert more parental investment to their children (e.g., nine months of gestation, breastfeeding, and upbringing), and thus, they become the scarce resource to which men strive to gain reproductive access (Trivers, 1972). This places women in a position where they can exercise choice, and when they do, they tend to prefer men with qualities which are most beneficial for them (Buss, 2003).

Since good athletic ability correlates with several factors (e.g., fighting ability, stamina, strength) that women are interested in and looking for in a mate, it pays off for them to prefer men with superior athletic abilities, and it pays off for men to demonstrate these abilities (Miller, 2000; Zahavi & Zahavi, 1997). Men can do so by participating in athletic competitions where they can compete in a standardized fashion, signaling their aptitude and simultaneously protecting themselves from cheaters (Zahavi & Zahavi, 1997). This is possible because athletic contests involve considerable physical strain. Men with limited physical capacities will be unable to compete, enabling the ones with superior physical capacities to stand out as winners. Consequently, cheating becomes more difficult and thus less frequent. On this basis, it has been proposed that intersexual competition driven by female choice gave rise to athletic contests, which evolved to enable men to reliably signal their unobserved physical abilities to women (De Block & Dewitte, 2009; Miller, 2000; Zahavi & Zahavi, 1997).

Men can also gain mating access to the opposite sex by excluding other competitors through force and therefore monopolizing the interest of women (Andersson, 1994; Puts, 2010). Successful intrasexual or male-male competition is contingent upon forging beneficial alliances and avoiding dangerous opponents. Thus, it is profitable for men to communicate to other men qualities such as physical strength, stamina, and good health, in order to be preferred as allies and be avoided as enemies (Lombardo, 2012). Accordingly, men congregate in dedicated areas to compete in sports to display their qualities and gain status, and the others, nonparticipating men, monitor the performances so that they can evaluate potential competitors and allies (Deaner, Balish, & Lombardo, 2015; Lombardo, 2012). In this respect, intrasexual or male-male competition constitutes the primary evolutionary force that has shaped men's tendency to compete against each other in a standardized fashion.

In most contemporary and historical pre-industrial societies, fathers and other male relatives control the mating decisions of their daughters and other female relatives, regulating in effect mate choice. Thus, men not only look for reliable information that will enable them to identify other males as allies and rivals, but they also look for capable men to become husbands for their daughters, sisters and other female relatives (Apostolou, 2014). Consequently, men have to compete against each other also in order to be selected as sons-in-law. Research on in-law preferences indicates that when parents exercise choice, they desire traits such as good hunting ability (e.g., in foraging societies), high resource-generating capacity, high social status and good health (Apostolou, 2010; Koster, 2011), all of which correlate with athletic abilities.

In effect, the athletic qualities of men are of interest to male parents, which means that in order to be chosen as sons-in-law, the former must have a strong incentive to signal their capacities to the latter. The reproductive benefits associated with being chosen as a son-in-law would motivate cheating; this indicates that men need to communicate their abilities in a cheat-proof way such as taking part in athletic contests, where athletes compete in a standardized fashion (Apostolou, 2014). On this basis, it has been argued that intersexual competition driven by male parental choice has been an important selection force responsible for shaping the interest in sports (Apostolou, 2015a).

To sum up, there are several hypotheses on the evolution of sports (for a more detailed exploration of these theories see Deaner et al., 2015). However, the empirical evidence favors the male-male competition and the parental choice ones. In particular, the female choice hypothesis proposes that men would engage in athletic competitions in order to signal their unobserved abilities to women in the audience. Yet, women are usually not in the audience, which is mainly dominated by men (Guttman, 1986, 2004). Furthermore, if the purpose of sports was to train men for hunting and fighting, there would be a strong interest in men to do sports, but not to watch other men doing sports. In other words, there would not be any particular

reason to sacrifice time to watch how a man is training for hunting. Accordingly, sports may have begun as training for hunting and combat, but most likely, in time, became the arena for intrasexual and intersexual selection that has shaped the adaptations related to the interest in watching and doing sports.

Overall, current evidence points towards the direction that sports evolved to enable men to signal their qualities to each other in a reliable fashion. In turn, this raises the question of which qualities would men be predominantly interested in observing and consequently signaling through sports.

### **Traits that Men are Interested in Observing and Signaling**

Men's preferences for doing and watching sports have been shaped by selection forces in ancestral environments (Balish, Eys, & Schulte-Hostedde, 2013; Deaner & Smith, 2013; Lombardo, 2012). In particular, most of the human evolution took place in a pre-industrial context, where our ancestors based their subsistence on hunting and gathering or in agropastoralism (Bellwood, 2004; Lee & Devore, 1968; Tooby & Cosmides, 1990).

In such context, men forge coalitions and raiding parties to attack other groups and get their resources, including women (see for instance the Yanomamo; Chagnon, 1992). In agropastoral pre-industrial societies, which are larger in population size, these raids are more likely to take the form of larger scale wars where bigger coalitions of men fight other coalitions of men for the purpose of getting their resources, one of which is women (Ember & Ember, 1995). In their struggle to monopolize resources, men also fight directly each other within a given society and seek the assistance of other men for doing so (Chagnon, 2013).

Going to war or to a raid with men lacking the capacities of good warriors, entails the high risk that this effort may fail, and consequently, the high risk of injury, captivity or death. Similarly, having allies who cannot help you when other men from your group attack you is like having no allies at all. It follows that when men seek allies, they would be interested in men with traits that make them good warriors and fighters. They would also be interested in these traits in potential enemies as they would like to avoid engaging in fights with men who are good fighters. In addition, good fighting abilities would be of interest to men seeking sons-in-law, because this would add to the family unit an individual that would be able to effectively protect the family's resources (including women), from the attacks of other men.

Furthermore, in a foraging context, individuals hunt together, with their success especially in taking down a large game, which requires a collective effort (Lee & Devore, 1968). Accordingly, traits that turn men to be good hunters are of interest to other men who look for hunting companions. Similarly, fathers are also interested in the resource acquisition capacity of a prospective son-in-law, which in foraging societies usually translates into being a good hunter (Apostolou, 2010). That is, the

division of labor in these societies is such that the primary contribution of men to the subsistence of the family unit comes from providing meat through their hunting effort (Lee & Devore, 1968). Men then will be looking for sons-in-law who have traits that make them good hunters (Koster, 2011).

In sum, in a pre-industrial context, men would be interested in the qualities that reveal other men as effective warriors and hunters. Consequently, men would be looking for reliable information on the traits that make a man an effective warrior and hunter. The next section will nominate several traits that might be good predictors of fighting and hunting ability.

### *Trait Nomination*

Men who are physically strong will be more effective in fighting other men than men who are physically weak, which makes physical strength an important trait for men to be interested in signaling through sports (Lombardo, 2012). In particular, anatomical evidence indicates that, for ancestral humans, the single most important factor driving the differential ability to inflict costs was the upper-body strength (Puts, 2010; Sell et al., 2009). In a pre-industrial context, hunting does not involve firearms, but weapons such as spears and bows, which require physical strength (Lee & Devore, 1968). In turn, this trait constitutes an important predictor of hunting success, with stronger men being more effective hunters than weaker ones (Gurven, Kaplan, & Gutierrez, 2006).

Raids, wars, and hunting expeditions do not last only for few minutes. Therefore, physical strength would not have been of much use if a man did not have enough stamina - that is, if he was not able to employ his physical strength for a sufficient amount of time. Stamina, then, constitutes a vital physical property of a successful fighter and hunter (Carroll, 2000; Chick, 1984, 2010). In addition, avoiding a deadly blow, exploiting the opportunity to give a deadly blow when opponents have lowered their defenses, running after a desirable prey or away from a dangerous one, all requires speed. Consequently, speed constitutes another important component of being a good fighter and hunter (Steudel-Numbersa & Wall-Scheffler, 2009). Moreover, fighting and hunting require dexterity. In particular, hunting and war efforts almost always involve the use of weapons (Lee & Devore, 1968). How effectively a weapon is used depends not only on physical strength and speed but also on dexterity, which constitutes yet another important trait in fighting and in hunting (Carroll, 2000; Gurven et al., 2006).

There are also two psychological traits that moderate the contribution of the physical abilities to fighting and hunting success, namely, aggression and team spirit. Starting from the former, a non-aggressive individual will not be an effective warrior or hunter, as these endeavors involve killing or harming other men and animals. To put it another way, a very strong man endowed with high speed, dexterity, and stamina, but who is not at all aggressive, is not a very useful ally in a war party, and

he is not a dangerous enemy (Lindenfors & Tullberg, 2011). Thus, aggressiveness is of interest to men who look for allies to approach and enemies to avoid.

Furthermore, wars, raids, and hunting demand the joint effort of several men. Physical abilities are of little use if a man is not able to cooperate effectively with other men. By not being able to do so, he is likely to compromise the success of the whole effort; for instance, he may scare away a prey or attract the attention of the enemy. In the same vein, a family is a team whose members work together towards achieving a common goal, namely, a successful survival and reproduction of its members. A prospective son-in-law with good physical abilities will be a valued new member as long as he can effectively work together with the other family members. In this respect, then, the capacity to integrate one's physical abilities with a team effort, i.e., to have a team spirit, is a trait that is of interest to men looking for allies (Lombardo, 2012).

Altogether, we propose that there are at least four physical qualities that predict fighting and hunting success: physical strength, stamina, speed, and dexterity; and there are at least two psychological traits which moderate the contribution of these qualities in fighting and hunting success: aggressiveness and team spirit.

#### *Differences in Popularity Between Sports*

A man who combines the above-nominated qualities can considerably increase an individual's fitness if he becomes his ally or in-law, and if he is avoided as an enemy. Therefore, men would benefit from getting reliable information on these traits, as this would enable them to make advantageous alliances and avoid dangerous enemies. Men would also benefit from communicating their qualities to other men, as they would be selected as allies and be avoided as enemies. Accordingly, men would be interested in exchanging information between them about these traits in a reliable way.

The interest for exchanging information reliably on the nominated traits creates cultural pressures, which results in the emergence of the athletic competitions or sports. In particular, men will invent ways to compete with each other in a manner that makes their unobserved qualities, such as stamina, observable. Nevertheless, not all sports are equally effective in communicating reliable information on these qualities. That is, some sports require higher competency in these traits, and consequently, how one performs will be more informative than how one performs in other sports, which require lower competency.

The former sports will be preferred by the spectators as they provide much more information than the latter. That is, for a given unit of cost spent (e.g., time), spectators can gain more information if they watch a sport which is more informative about the qualities of interest than a sport which is less informative. Accordingly, it is hypothesized that the higher the capacity of a sport to reliably communicate information on these traits, the higher it will be in the hierarchy of popularity.

## Methods

### *Participants and Procedure*

Three research assistants were employed for the purposes of this study. Participants were recruited through an advertisement that was placed on the University's website. To qualify for participation, an individual had to be an adult (18 years or more). The study took place in the Republic of Cyprus, and the participants came predominantly from the two biggest cities of the country - Nicosia and Limassol. The data collection process lasted approximately one month. The individuals who indicated an interest in participating were contacted by the research assistants who visited them in their own homes or places of work to administer the questionnaire. Participants were initially asked to sign a consent form, and then they were given the survey. Upon completion, the participants put the questionnaire in an unmarked envelope and sealed it.

In this study, 210 Greek Cypriots took part (101 women, 109 men). The mean age of women was 28.7 ( $SD=5$ ), and the mean age of men was 28.7 ( $SD=9.3$ ). Moreover, 30.4% of the participants were in a relationship, 37.6% were single, 20.1% were married, and 11.9% were divorced. No other demographic variables were measured.

### *Materials*

In order to get a measure of popularity for individual sports, data from the International Survey Programme (ISP) were employed. The ISP is a continuing annual program of cross-national collaboration on surveys, covering topics which are deemed to be important for social science research. At present, 48 countries around the world are represented in the program. Every survey includes questions about general attitudes towards various social issues, including the legal system, gender, and the economy. Special topics have been included, such as the Leisure Time and Sports 2007 survey, which aims to address issues such as the meaning of time and leisure and its relation to work and other spheres of life, as well as sport/game activities and subjective functions of sport and games. The data employed in the analysis come from this special topic (ISSP Research Group, 2009: International Social Survey Programme, 2007).

The survey instrument was composed of 98 questions, which were primarily focused on assessing how people spend their free time, and what motivates them in pursuing specific leisure activities. For our purposes, we employed the question where participants were asked to indicate which sport they were more frequently watching on TV. Participants could only indicate one sport. Based on the participants' answers, we identified the 34 more popular sports. Please note that the rodeo and the

cockfighting were not included in our list as they predominantly involve non-human participants.

Our main goal was to examine whether sports with a higher capacity to communicate information about the nominated qualities will be higher in the hierarchy of popularity. Accordingly, our first step was to construct the hierarchy of the popularity of individual sports. To this end, we estimated the frequencies of participants' answers from the ISP dataset on the question of 'Which sport you prefer to watch more frequently on TV?', and then we ranked individual sports, placing first the one which had the highest frequency and last the one which had the lowest frequency. The rankings are presented in Table 1 where we can see that the most popular sport is football (soccer) and the least popular one is squash.

The survey was in Greek and had two parts. In the first part, participants were given the following scenario: "Below you will find a number of sports along with several traits that athletes may have. Please rate how important you consider it for an athlete to be endowed with each trait in order to compete successfully in a given sport." They were then asked to rate the 34 sports identified to be the most popular in six traits: team spirit, aggression, dexterity, strength, stamina and speed using a seven-point Likert scale: 1 - *not at all important* and 7 - *very important*. The sports were placed in alphabetical order. Participants were instructed to leave blank the sports which they were not familiar with in order to reduce bias, as not all participants were expected to be familiar with all sports. In the second part demographic information was collected (i.e., sex, age and marital status).

## Results

We begin by estimating how each sport fares in signaling information about the traits of interest. For this purpose, we employed participants' scores for the traits required for competing successfully. In particular, we estimated the mean scores for each trait in each sport, and then we ranked sports in each trait dimension by placing first the one with the highest mean and last the one with the lowest mean. The results are presented in Table 1 where we can see that, for example, football comes first in terms of speed and stamina and second in terms of team spirit.

In order to get a measure of which sport demands higher competence in the nominated qualities to be played successfully (and thus, which one can potentially signal information for most qualities) we summed the rankings for each sport in the six traits, and based on these scores, we ranked sports by placing first the one which had the lowest score (a lower score means a high average rank) and last the one which had the highest score. The results are presented in Table 2.

In this way, the combined ranks variable can be considered to indicate the capacity of a given sport to communicate reliable information for the six nominated traits. That is, an athlete who competes in a sport which ranks high in this hierarchy



needs to score well in more of the nominated traits than an athlete who competes in a sport which scores low in this hierarchy. Therefore, observing athletes competing in a sport which ranks higher is more informative about their qualities than observing athletes competing in a sport which ranks lower. For instance, football, which comes at the top of this hierarchy, ranks below 10 in none of the six traits, which indicates that for athletes to be successful, they need to do well in all six traits. Thus, sports higher in the hierarchy have a higher capacity to signal information about desirable qualities than sports lower in the hierarchy.

We can now examine whether the hierarchy of popularity and the hierarchy of traits are correlated. That is, if we know how well a sport scores in signaling information on the nominated traits, we know something about where this sport is found in the popularity hierarchy. For this purpose, we applied Spearman's rank order correlation between the ranks of popularity and the ranks of traits. The results indicate a significant positive and moderately strong correlation [ $r(34)=.46$ ,  $p=.01$  (two-tailed)], which means that if we know where a sport is in the combined traits hierarchy, we can make a moderately accurate prediction about where this sport is in the popularity hierarchy. In addition, the positive correlation indicates that if a sport's ranking in the combined traits hierarchy increases, its rank in popularity will also increase. That is, a sport which has a higher capacity to signal information about desirable qualities is likely to be more popular than a sport which signals information about fewer qualities.

Table 1. *The Rankings of Individual Sports for Each Trait*

Sports	Preference in watching ranking	Ranking based on combined qualities	Team Spirit	Aggression	Speed	Dexterity	Stamina	Strength
Football	1	1	2	6	1	10	1	10
Baseball	2	9	6	10	5	18	18	8
Rugby	3	3	8	2	2	25	7	1
Basketball	4	2	1	8	4	11	4	13
Skiing	5	24	33	25	19	14	26	19
Tennis	6	6	15	12	7	4	5	11
Motor Sports (Motor Racing, Go Carting)	7	22	27	7	17	16	29	25
Ice Hockey	8	4	7	3	6	13	12	6
Martial Arts	9	5	22	1	11	6	9	2
Ice skating	10	18	14	28	22	7	22	22
Athletics (Running, Long-/High-Jumping, Marathon)	11	15	28	19	3	32	2	16
Volleyball	12	10	3	13	15	15	14	12
Cricket	13	21	10	17	25	20	27	21
Golf	14	30	30	26	32	1	32	31
Handball	15	8	4	5	9	22	11	7
Cycling	16	16	25	21	10	30	8	15
Horse-Riding	17	34	31	24	29	24	30	30
Bodybuilding	18	25	34	15	33	31	20	3
Dancing	19	23	11	34	27	3	17	29
Swimming	20	13	21	22	8	28	3	9
Billiards	21	31	23	30	34	2	34	34
Netball	22	17	9	14	21	26	24	17
Fitness (Aerobics, Exercise Machine-Training)	23	26	20	31	28	29	13	20
Skating	24	27	26	27	23	19	25	28
Bowling	25	28	16	29	31	12	33	27
Fishing/Hunting	26	33	19	23	30	27	31	33
Table Tennis	27	19	17	16	16	8	28	32
Sailing	28	12	12	20	24	9	19	5
Polo	29	7	5	11	13	17	6	4
Walking/Trekking	30	32	29	33	26	33	15	26
Jogging	31	29	32	32	18	34	10	24
Badminton	32	20	13	18	20	21	23	23
Fencing	33	11	24	4	12	5	21	18
Squash	34	14	18	9	14	23	16	14

### *Traits Individually*

We would like to know how the capacity of a sport to signal each trait individually correlates with the popularity hierarchy. Accordingly, we applied Spearman's rank order correlation between the ranks of popularity and the ranks of nominated traits. The results are presented in Table 2. The first thing we can observe is that all traits are positively correlated with the popularity hierarchy. This indicates that the higher a sport ranks in a given trait, the higher its popularity is going to be. The stronger correlation comes for speed, aggression, and strength. For stamina, team spirit and dexterity, the correlations are positive and they approach the significance level without passing it.

In our hypothesis, when people watch sports, they would be interested in getting information for more than one trait. If this is so, the more information we have for more traits, the more we know about where the sport is going to be in the popularity hierarchy. To examine whether this is the case, we calculated the ranks for a combination of traits, starting from the ones with the lowest correlation in Table 2. To estimate the combined ranks we employed the following procedure: we added the ranks of two or more nominated traits to get scores for each sport; for instance, for dexterity and team spirit, football got a score of 12 (2 for team spirit and 10 for dexterity). These scores we then ranked, putting at the top the sport with the lowest score. The new combined ranks variable was then correlated with the variable indicating the popularity of sports.

Note that different combinations can be estimated, but it would not be fruitful to estimate them all. Spearman's rank order correlation was applied between the ranks of popularity and the ranks for each combination of traits and the results are presented in Table 2. We can see that the variables combining ranks for more traits are more strongly correlated with the popularity hierarchy than the ones which combine information for fewer traits. We can also see that the combined variables have generally higher correlations than individual variables.

Table 2. *Spearman's Correlations of Traits with the Preferences for Watching Hierarchy*

<i>Traits</i>	<i>r</i>	<i>p</i> -value
Speed	.44	.01
Aggression	.39	.02
Strength	.36	.04
Stamina	.28	.11
Team spirit	.27	.13
Dexterity	.23	.19
<i>Combinations of Traits</i>		
Dexterity * Team spirit * Stamina*Strength*Aggression*Speed	.46	.01
Dexterity * Team spirit * Stamina*Strength*Aggression	.43	.01
Dexterity * Team spirit * Stamina*Strength	.42	.01
Dexterity * Team spirit * Stamina	.34	.05
Dexterity * Team spirit	.34	.05

## Discussion

Consistent with the original hypothesis, sports with a higher capacity to communicate information on the nominated qualities are more popular to watch, while those with a lower capacity are less popular.

The results of this study provide insights that can potentially increase our understanding of the cultural evolution of sports. In particular, athletic competitions require resources such as time and money in order to take place. As in any given society resources are finite, there is space only for a limited number of sports to be popular, which, in turn, means that the ones which are better in signaling desirable information will spread (i.e., they will become more popular) at the expense of the sports which are not as good in doing so. In different words, cultural evolution takes place as specific sport variants are selected over others (for a more comprehensive account of cultural evolution see Mesoudi, 2011; Richerson & Boyd, 2004).

Selection will not take place only between different sports, but also between different versions of a single sport. For instance, once a sport has emerged, some people may decide to modify its rules or the way it is played in order to enable better signaling of unobserved qualities (e.g., introducing more refined rules of participation to prevent cheating). This new version of the sport will be more popular than the previous one as it will be more informative on unobserved qualities. Thus, the new version will replace the older one, and through this process of cultural evolution, will emerge sports which will efficiently and reliably signal information about qualities of interest. Accordingly, the different sports we have today constitute the products of a cultural evolution driven by men's preference to observe specific unobserved qualities in other men and men's preference to signal these qualities.

Furthermore, the results suggest that some sports specialize in signaling specific qualities rather than being good in signaling many. For instance, football ranks first in the hierarchy of combined ranks, and it is also first in the hierarchy of people's preferences. On the other hand, billiards scores 31st in the hierarchy of combined traits and it is 21st in people's preferences. We can see, nevertheless, that although billiards scores low in most traits, it comes second in dexterity, while football comes 10th. Thus, football can be informative about several qualities of interest, but billiards can be more informative about one specific quality.

This is probably one of the reasons why the cultural evolution of sports did not result in a single sport alone, being efficient in transferring information on desirable qualities, and the elimination of all other sports which are less effective in doing so. That is, there is not a single sport which can efficiently transfer information for all qualities of interest, allowing in effect space for other sports to exist; sports which specialize in transferring information about specific qualities. Although the sports that signal information for fewer qualities will be less popular, their efficiency in signaling a specific quality will make them popular enough to be maintained in the

population. This research is also informative on which qualities individual sports specialize in signaling.

Moreover, sports will evolve to fit local environmental conditions. As there is variability in local conditions, there will be variability in sports, i.e., we may have different sports which are adapted to different environments. For instance, in environments where there is water around, water sports will emerge; if the water is usually frozen, snow sport will emerge. Overall, there is diversity in environmental conditions and it is unlikely that there will be one sport that fits well all environments. Consequently, cultural evolution has produced several different sports to fit the different conditions.

It can also be argued that another predictor of popularity is how well a sport fits different environmental conditions. In particular, sports fitting well many different environmental conditions can become globally popular, which in turn creates a dynamic for watching. In this sense, the capacity of a sport to fit local conditions constitutes a predictor of popularity. This capacity can interact with the capacity of a sport to signal information about desirable qualities, and this interaction can explain the high global popularity of certain sports. For example, football (soccer) has a high capacity to be played in different conditions and a high capacity to transfer information about desirable qualities. That is, it can be played in cold weather, in warm weather, under rain and snow. And this is perhaps one of the reasons why it is so popular across different countries, with the 2014 World Cup (Mundial) to have been watched on TV by more than 3 billion people (FIFA, 2014).

This work can also provide insights into the development of new sports. For instance, in order to invent a new sport, it needs to be taken into consideration if the sport has a high capacity to signal information about the nominated traits. If it does not, the chances are that it will not become popular in watching.

The proposed evolutionary framework can also be applied in explaining the popularity in doing sports. In particular, it is expected that sports which have a higher capacity to transfer information on the nominated qualities will be higher in popularity for doing and the reverse. Still, it is expected that the strength of the correlation would be weaker in comparison to popularity for watching, as there may be other important factors that influence popularity for doing sports. In particular, in post-industrial societies, people are strongly motivated to participate in sports not only to signal their abilities to others, but also for improving their looks and health (Apostolou, 2015b). This means that a sport will be very popular if it can serve this purpose well. For instance, aerobics are expected to be much more popular in doing than in watching, as they may not be particularly informative about aggression, dexterity, physical strength and speed, but they are good for burning fat. Future research needs to investigate whether the capacity of a sport to signal unobserved qualities also fits the hierarchy of popularity in doing.

One limitation of this study is that the hierarchy of popularity for watching a sport was constructed on the basis of data from a cross-cultural sample, while the

hierarchy for the capacity of individual sports to transfer information about specific qualities was constructed on the basis of data from a single culture. This may introduce a bias as, for instance, in a given cultural setting individuals may give ratings for specific sports which can better explain the popularity for watching these sports, but which may not be equally good in explaining the popularity of these sports in a different cultural setting.

A further limitation is that the hierarchy of popularity was constructed on the basis of preferences for watching sports on TV. One advantage of watching sports on TV is that there are few, if any, constraints. For instance, violence or an expensive ticket may prevent some people from attending a given sport even if they wish to do so. Thus, watching televised sports is free from such problems, which turns this variable useful for our analysis. However, there is a bias here as people may be interested in watching certain sports that may not be broadcasted, resulting into underestimating their ranking. Another issue is that there are alternative ways to watch a sport, such as physically going where it is played, listening to the transmission over the radio or watching it online; these ways were not taken into consideration in this study.

In addition, this study nominated several traits that individuals would be interested in observing; yet, although we believe that these are the main ones, it is unlikely that they are the only ones. Other possible qualities may include patience, flexibility, and accuracy. Future studies need to extend this research by exploring whether there are other traits which contribute to the popularity of a given sport. Last but not least, the ratings that participants gave for each sport are unlikely to be perfectly accurate; one reason being that the sample does not consist of individuals who are sports experts. The results of this study can be replicated by employing experts to provide ratings for each sport.

To conclude, there are many different sports, some more popular and some less popular than others in watching. Based on evolutionary reasoning, it has been argued that sports which have a higher capacity to signal information on six nominated traits will be more popular in watching than those which have a lower capacity. The results of this study are consistent with this hypothesis, and future studies need to explore it further, which would contribute to our understanding of what makes a sport popular.

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## **Želim to gledati! Evolucijska perspektiva popularnosti sporta**

### **Sažetak**

Premda postoje brojni sportovi, neki su neki popularniji od drugih. Ovim se radom pokušava odgovoriti na pitanje zašto sportovi variraju u popularnosti. Za ostvarenje je tog cilja korišten evolucijski okvir koji indicira da je sport evoluirao da bi omogućio pouzdanu izmjenu informacija o neopaženim osobinama. Izdvojeno je šest takvih osobina: fizička snaga, izdržljivost, brzina, spretnost, agresivnost i timski duh. Na temelju je toga postavljena hipoteza da su sportovi koji zahtijevaju više kompetencija u navedenim osobinama, a pritom i bolje prenose informacije u spomenutim dimenzijama, popularniji od onih koji zahtijevaju manje kompetencija. Analiza provedena na temelju 34 različita sporta potvrđuje ovu hipotezu. Implikacije su dobivenih rezultata opisane u radu.

**Ključne riječi:** popularnost sporta, evolucija sporta, kulturalna evolucija sporta, iskrena signalizacija

## **¡Quiero verlo! Perspectiva evolutiva de la popularidad del deporte**

### **Resumen**

Aunque existen numerosos deportes, algunos son más populares que otros. Este trabajo trata de responder por qué los deportes varían en cuanto a la popularidad. Para lograr este objetivo se ha utilizado un marco evolutivo que indica que el deporte ha evolucionado para posibilitar un intercambio fiable de informaciones sobre las características no notadas. Se han extraído seis características de este tipo: fuerza física, resistencia, velocidad, habilidad, agresividad y espíritu de equipo. A base de esto se ha llegado a la siguiente hipótesis: los deportes que exigen más competencias en dichas características, y al mismo tiempo transmiten mejor las informaciones en dimensiones mencionadas, son más populares que aquellos que exigen menos competencias. El análisis llevado a cabo a base de 34 deportes diferentes confirma esta hipótesis. Las implicaciones de resultados obtenidos están descritas en el trabajo.

**Palabras claves:** popularidad del deporte, evolución del deporte, evolución cultural del deporte, señalización honesta

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