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What is Strength?

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Abstract: In this paper we argue that physical strength is in philosophical terms best understood as general agentive ability to exercise difficult physical effort. We develop this metaphysical claim about strength, by focusing on the historically developed most paradigmatic test of overall strength: The sport of Strong (Wo)Man. We extract the understanding of strength present in this sport, and show how the current philosophical agents' abilities, and physical effort, lend themselves to capture the essential features of strength, providing the justification for our claim. Finally we argue that strongman itself is already surprisingly well thought through to assess strength, balancing different tradeoffs that exist when quantitatively attempting to measure strength, making it a robust epistemic tool to determine strength in an interdisciplinary manner.

Keywords: Effort; Physical effort; Strength; Ability; Strength sport; Strongman; Ontology of strength

“No man has the right to be an amateur in the matter of physical training. It is a shame for a man to grow old without seeing the beauty and strength of which his body is capable.”

— Socrates (469–399 B.C.E.)

0. Introduction

When is the strongest man in the world not the world's strongest man? This isn't a trick of language but the basis of an argument which overtook the sport of strongman in 2017. That year, the World Strongest Man competition was won by Briton Eddie Hall over Icelandic athlete Hafþór 'Thor' Björnsson. Fans, and even athletes, alleged that the contest organizers had chosen events which favoured Hall over Thor. Coupled with some contentious judging decisions, Hall's victory set the world of strongman alight (Barbend, 2023). Was he the strongest man in the world or not? While the dispute between Hall and Thor eventually culminated in a professional boxing match, the controversy itself is of interest. Fans, athletes and judges have an inherent philosophical interest not only in the definition of strength, but how it is measured. While the importance of strength and exercise is discussed in philosophy, going back to ancient Greece, surprisingly, modern philosophers have not asked the philosophical question raised by the very notion of "strength": What is strength?

To address this question we consider one of two cultural practices intended to answer the question "who is the strongest? Namely, moving and resisting heavy objects to demonstrate strength, developed from prehistoric stone lifting, represented today by modern strongman Competitions such as World's Strongest Man (WSM). The other cultural practice for determining who is the strongest, came in the form of martial combat - today demonstrated in Boxing or MMA, but arguably presenting a very different understanding of strength.

Our exploration of strength focuses on the sport of strongman. We propose that strongman is the result of a historical calibration process that assumes a philosophically coherent understanding of the nature of strength, which produced surprisingly practical solutions to the challenge of assessing strength, making it a balanced epistemic approach to addressing fundamental issues of strength assessment.

In Section 2, “History of Strength Sports”, we outline the history of strength sports leading to modern strongman competitions which we use to inform our philosophical analysis. In Section 3, “The Ontology of Strength”, we further use this history to propose constraints for our proposal on the nature of strength, and provide an account of what strength is, matching these constraints. In Section 4, “The Objectivity and Pragmatics of Strength Assessment”, we discuss the problems of assessing strength and how strongman competitions provide a balanced pragmatic solution, showing that strength as it is conceptualized herein is epistemically accessible. In Section 5, “Conclusion”, we summarize our key arguments.

1. History of Strength Sports

The history of strength assessment leading to the development of modern strongman competition helps contextualise why the sport of strongman, as a member of the modern strength sports family, is arguably the most widely accepted discipline that can lay claim to determining who the strongest athlete is. Strongman, from which we will extract and analyze the understanding of strength, is not arbitrarily constructed, but rather, it is the result of repeated socio-cultural calibrations in how strength was assessed, settling on its modern format. Specifically, the history of strength assessment leading up to strongman supports the notion that strength, as demonstrated in strongman, is not arbitrary, but a robust representation of the folk understanding of strength.

1.1. From Early Strength Tests to Sports

Records of strength training and competition predate the formalisation of strength competitions by several centuries. While John Huzinga is credited with helping to popularise the study of play (1938), strength has served both a utilitarian and recreational role globally. Often

'pre-modern' strength feats were conducted by soldiers, sailors, stonemasons or farmers; those for whom strength played a role in their day-to-day livelihoods. Work elsewhere notes strength cultures and practices in Ancient Europe, Asia and Polynesia (Kyle, 2014). Objects used in the pre-modern period varied between swinging heavy cauldrons in China (*ding* lifting), heavy clubs in India and Persia (*joris* and *meels*), bags of sand in ancient Egypt or lifting heavy stones either to the chest or overhead in ancient Greece (Kyle, 2014). This variety continued into the seventeenth century when precursors to modern strength athletes like Englishman Thomas Thopham lifted objects overhead, rolled pewter dishes using his bare hands and lifted heavy weights in a harness. No singular object existed to prove one's strength, rather objects known to mass audiences were chosen (Kent, 2021). Strength historian Terry Todd explained that strongmen, and at times strongwomen, used common objects to display their strength (Heffernan, 2022) to ensure the general public was familiar with the weight or the impressiveness of the feat.

While no single object or lift ever universally typified strength, humans have displayed their strength in one of four common ways: lifting a heavy object overhead; swinging an object, lifting an object to waist or chest height, and carrying a heavy object. Of these four movements, lifting an object from the ground or overhead, and carrying a heavy object, continue to hold the most cultural relevance (Webster, 1993). As strength technology and commercialism grew in the nineteenth and twentieth century, squatting a heavy weight was added. These four, or five, movement patterns have many variations. For example, while a deadlift starts with lifting an object from the floor with bent knees and finishes when the individual stands upright with straight legs, in the sport of powerlifting (established in the 1960s) deadlifts can be 'conventional form' with the feet inside the hands and hips roughly at shoulder width or as a sumo deadlift with the feet wider, outside the hands (Warphea, 2013). In different powerlifting competitions and federations, athletes are allowed to use different forms of equipment (straps, belts, deadlift suits etc.) (Morais, Todd and Pollack, 2021). In other sports, such as strongman or

strongwoman, deadlifts might be conducted from a slightly higher height than in powerlifting or using entirely different implements (a barbell in powerlifting versus a thick grip barbell or oddly shaped object in strongman). Further, many non-competitive deadlift forms are used in training with different stances or implements. Basic movement patterns hold largely true across the various strength sports which exist in the modern age (weightlifting, CrossFit, strongman/strongwoman, highland games etc.)

Therefore, the subjective and constructed nature of strength competitions is worth stressing. Official strength contests underwent the same 'sportification' as other activities during the nineteenth century. Emblematic are weightlifting, powerlifting and strongman/woman activities, the most prominent strength sports, which encountered internal schisms and debates when deciding how best to test strength. Weightlifting has three origin points. A World Weightlifting Championship was held in London in 1891, the 1896 inaugural Olympics featured weightlifting and, in 1920, the sport welcomed a world governing body which survives to present day (Bonini 2019). This complex history stems from interpersonal, and even geo-political disputes about strength.

1.2 Strength Sports: From the 19th to the Mid-20th Century

Gottfried Schodl decried the chaos of early weightlifting. Specifically, there was no global governing body and various movements were used in competition. The 1891 World Weightlifting Championship featured several lifts, none of which were used in the 1896 Olympic Games. Between 1891 to 1914 over twenty global weightlifting contests (including two Olympic games) took place with little to no continuity between contests (Schodl, 1995). One year a weightlifting championship focused on pressing a barbell overhead with two hands, while the next year it centred solely on one-handed lifts. Vitriolic debates about what constituted legitimate strength compounded matters, centred on what was described at the time, as whether athletes used the German or French method of weightlifting (Bonini 2019). Under the French method, athletes

had to use strict form and rigid body positions. For example, when pressing athletes were only permitted to rest the barbell on their clavicle before pressing it overhead without leaning backwards, and they were not permitted to touch their body with the weight during one-armed lifts. The German method (or 'continental method' as it is now known) allowed athletes to drag barbells up their torsos, resting it at several points. When pressing overhead, they could jerk their bodies or lean backwards, allowing them to use more weight.

Twice during 1901 to 1914 efforts at centralising weightlifting under a single federation failed because national representatives refused to use an opposing style. Edmond Desbonnet, a French physical culturist and fitness writer, led the French charge against the German method, describing it as vulgar, unhygienic and done only to appease those of lower descent (Schodl, 1995). On their part, multiple German representatives accused those French method promoters of fearing the heavy weights used with the German method. Other voices came from Russian, Italian and Danish federations favoring and opposing both systems in equal measure. Further complicating matters was whether or not strength should have a stylistic or aesthetic component. At the 1896 Olympics a tie between weightlifters was decided based upon who lifted the weight with the most graceful form. This decision so incensed one judge, Britishman E. Lawrence Levy that his angry outbursts became lore within the weightlifting community (Bonini 2019). And yet, rules continued to be arbitrarily applied within the sport. In 1905 three separate World Weightlifting Championships were held, each in a different location using a different set of rules. In 1912 another effort at organising weightlifting resulted in the creation of a global body, the *Internationaler Weltverband für Schwerathletik* (International Federation of Heavy Athletics), but again, no formal rules were agreed upon. It wasn't until after the Great War (1914-1918) that the *Fédération Internationale de Poids et Halteres* (International Federation of Weights and Dumbbells) finally organised the sport around a set number of exercises, all executed in the French style (Hefferman & Boucher, 2023). Critically this was possible due to deliberate exclusion of German and Austrian sport organisations in the aftermath of the Great War. By the

time these nations were re-admitted in 1925 to weightlifting, the sport had enjoyed several years under the new rules and a status quo was reached. This was further solidified in 1928 when weightlifting changed to include only three movements considered objective tests of strength: the clean and jerk, snatch and clean and press. Note that each movement features pressing a weight overhead as the ultimate test of strength. By 1972 judging protocols for the military press had been repeatedly questioned, leading the International Weightlifting Federation to remove the military press at the Olympics because they felt athletes were compromising the agreed upon postures and forms in the lift to allow them to lift heavier weights (Fair, 2001). It is worth noting that from the 1891 contest, which is generally regarded as the first international strength contest, competitions were scored on a points system, adjudicated by independent referees, mimicking the broader standardisation of sport across the nineteenth-century.

1.3 Strength Sports After the Second World War

Weightlifting was the dominant strength sport, globally, from the late nineteenth century to the mid-twentieth century. As John Fair noted (1999), it was only after the Second World War that oddlifting (what eventually became powerlifting) rose in popularity. Weightlifting tests dynamic strength by lifting a barbell overhead. Powerlifting, however, focuses on more static movements: the squat (squatting down then up with a barbell on the back), the deadlift (lifting a barbell from the floor to an erect stance) and the bench press (pressing a barbell from the chest to full arm extension while lying on a bench). During the 1950s, several breakaway federations in the United States and Great Britain began holding competitions featuring these lifts, in direct competition to weightlifting. Peary Rader (1956), editor of one of America's most influential fitness magazines during the 1950s - *Ironman magazine* - wrote of this time as a conflict between weightlifters and powerlifters. Those interested in powerlifting believed the squat, bench and deadlift were 'truer' tests of strength than weightlifting. Those in positions of power,

like head of American weightlifting Bob Hoffman, believed these movements were useful only as accessories to weightlifting (Fair, 1999). Again, philosophical questions arose about what constituted strength. Further complicating matters were differences in opinion between British and American powerlifters. In the early 1950s the British Amateur Weightlifting Association (BAWLA) began hosting squat, deadlift, curl (lifting a weight in the hands, from the waist while standing to chest height with the biceps) competitions, while the Amateur Athletic Union (AAU) in America used the squat, bench and deadlift. Thus, powerlifting experienced two schisms: one between powerlifting and weightlifting and the other within powerlifting itself.

In powerlifting, national competitions were held using both the British and American standards for several years before BAWLA removed the curl in favour of the bench press. This was done to help unify the sport and, in 1971 the first international powerlifting competition was held featuring athletes from both the United States and Great Britain (Warphena, 2013). While powerlifting resolved their internal question of 'what is strength?' quickly, the tension between weightlifting and powerlifting took on serious sporting and legislative complications. During the 1970s weightlifting campaigned heavily against powerlifting receiving Olympic status or recognition. The argument was that because weightlifters used the squat, bench and deadlift in training, it was spurious to have a competition focused on what were, in effect, 'training' movements (Schodl, 1995). Powerlifting, organised under the International Powerlifting Federation, countered that the powerlifting movements were separate feats of strength from weightlifting. Eventually the war of words dissipated and powerlifting remained a non-Olympic sport but the tensions became legitimate points at an IOC level. It is useful to conceptualise strength in three phases or eras. During the 1950s, when weightlifting was the dominant strength paradigm, the 'Strongest Man in the World' title was usually informally bestowed on the reigning heavyweight weightlifting champion (i.e. the man who could press the most weight overhead). During the 1960s and 1970s, some powerlifters were given this title based upon their three-lift 'total' or by achieving certain milestone lifts (say a 1,000 lbs. squat). Thus weightlifting

was the dominant strength paradigm from the 1890s to 1960s, then it became powerlifting from the 1960s to 1980s. Currently the most accepted third paradigm is the rise of 'strongman' competitions from the 1980s to present day.

During the 1970s, ABC produced a new, popular program *Superstars*, inviting athletes from various sports to determine the best athlete across ten unknown events. *Superstars* indirectly led to the creation of the WSM, or "Strongman" as a purest (Webster, 1993). Created by CBS, it followed *Superstars'* format; strength athletes from several disciplines (shot put, wrestling, bodybuilding, powerlifting etc.) competed in a series of unknown events ranging from keg lifting, bending bars and tug of war. The 1977 inaugural WSM set the scene for strongman for the next decade. Critically, 'modern' strongman's origins in television, rather than strict sport, caused problems for athletes. In 1977, competitors had to race with refrigerators strapped to their backs due to its entertainment value despite organizers' concerns about athlete welfare. One athlete broke their leg under the refrigerator's weight. Nevertheless, the WSM became annually televised. Initially, the WSM was a decidedly American affair, hosted in the United States until 1983 when it came to New Zealand, with most competitors being US athletes (Edmunds, 2019). The first WSM's judging format has been replicated in subsequent competitions with few, if any, deviations. Competitions are split between a series of events, with points awarded in each. A first place finish earns 10 points, second place 9 points and so on. While the metric for success varies from event-to-event (highest repetitions, weight lifted, or distance etc.) the point system remains stable. Therefore, athletes oftentimes have both strengths and weaknesses, requiring strategies to make up ground, e.g. an athlete weak in lifting Atlas stones may attempt to overstretch themselves in a max deadlift to compensate. Whereas traditionally strength was judged purely by the weight lifted or the number of repetitions, this system's origins stem from the predecessor, ABC *Superstars* programme, which first used this system, rather than strength sport. Interestingly, no rival judging system has ever been seriously considered in the past fifty years.

By the mid-1980s, WSM copy-cats emerged such as Britain's Strongest Man, Ireland's Strongest Man, Iceland's Strongest Man, etc. Despite rival strongman competitions and leagues emerging, the depth and diversity of competitors at WSM increased and the WSM became the sport's premier competition. By the late 1980s and early 1990s, a new generation of athletes emerged. Unlike previous generations, they were not from other sports, but 'professional' strongmen focused solely on strongman competition. Events became increasingly standardized, revolving around stone lifts, overhead pressing, loaded carries, and heavy pulling, aiding strongman's 'sportification' (Webster, 1997). This evolution culminated in the 1997 World Strongest Woman (WSW) competition being hosted for the first time, defined by rules, judging processes and known equipment. Critically the WSM remained an entertainment/sporting event, televised and informed by media concerns, whereas the WSW was run by a private entity.

1.4 Strength Sports in the 21st Century

In 2002, Arnold Schwarzenegger and his business partner, Jim Lorimer, hosted their own strongman competition known as the Arnold Strength Summit (later Strength Classic) - causing a critical split in strongman (Todd, 2003). Co-created with strength historians and competition organizers Terry Todd, Jan Todd, and David Webster, the Arnold Strength Show was part of a broader health and fitness exhibition with roots from the 1980s. In Terry Todd's retrospective on the origins of this show, he explained how he and the other organizers felt that many WSM events, such as lifting implements for timed maximal repetitions, or carrying them over 20-40 yards for time were not 'true' tests of strength, because they rewarded athletes with higher endurance rather than maximal strength. They set out to determine who was stronger, who could lift 1,000 lbs. from the ground once, rather than a WSM event determining who could lift 800 lbs. five or six times. Thus a distinction was created between the WSM testing strength and endurance and the Arnold testing strength in its 'purest' form.

The creation of a rival WSM competition, the International Federation of Strength Athletes (IFSA), in the early 2000s created a conflict among athletes. WSM Athletes were not eligible to compete in the IFSA and vice-versa (Heffernan, 2022). However, both groups of athletes could compete at the Arnold. But, for several years the WSM winner did not compete in the Arnold, which led to debates about which man was stronger. Anecdotally, the fan consensus indicated that the Arnold winner was the strongest man in the world. While the distinction between the competitions, and the athletes who compete in them, has diminished in recent years, their organizing philosophies (entertainment versus maximum strength) remain. Strongman professionalized in the 1980s as a sport but still operates on an entertainment/sport nexus. This predates the WSM, mirroring the Vaudeville days of music halls. Both the WSM and Arnold rely on strongman lineage. The WSM has used strength objects from the Ancient World such as heavy cauldrons in China ('ding lifting') and more contemporary objects such as French strongman Louis Uni's 'Apollon' wheels from the early twentieth-century. Likewise the Arnold uses heavy stones from eighteenth and nineteenth century Scottish and Icelandic strength cultures. This 'invented tradition' adds legitimacy and cultural longevity. A fascinating example is the use of the 'Cyr' dumbbell in both competitions. Named after strongman Louis Cyr (1863-1912), the dumbbell was originally a loadable dumbbell reaching 270 lbs. at its highest weight. In modern strongman competitions Cyr dumbbells come in a variety of weights, the heaviest being 320 lbs.. This use of naming highlights the continually evolving use of history in strongman.

Modern strongman and strongwoman uses both single maximum lift attempts and maximal repetitions efforts. Harking back to its show-business origins, these competitions also include distance efforts of some sort, like carrying or pulling heavy objects (often theatrical in style like cars, logs, fridges, planes, or trucks) . Competitions follow a sporting format with judges, point scoring systems and qualifiers. Thus, the sport marries 'legitimate' sporting structures with the need for entertainment.

2. The Ontology of Strength

With this historical and cultural context we return to asking “what is strength?” Instead of *a priori* speculation on the nature of strength, we focus on strongman and its folk ontology of strength¹ as this understanding is more than an arbitrary stipulation. Strongman emerged from centuries of attempting to accurately and fairly test strength, thereby implicitly engineering an understanding that strength has some *prima facie* credibility. Further, this *prima facie* credibility is also backed by exercise science, as discussed in section four. Hence the concrete ontological question we ask is:

Ontological Question : What is strength in Strongman?

Our historical investigation indicates a widely shared view of what makes someone the strongest, which we will call the Historical Intent:

Historical Intent: The strongest can move or hold the heaviest weight.

Second, our historical investigation indicates salient and lasting features of strength assessment that still dominate strongman events used to assess strength in line with the Historical Intent.

We call them Salient Features:

Salient Features:

- i) Making the weight lifted transparent/objective (e.g. by using common objects or standardized equipment and events)
- ii) Performing multiple movement patterns across multiple events to assess strength.
- iii) Judging each event with point values that in sum determine who is the strongest.

¹ All humans share a folk ontology of the things they believe exist in the world, using shared concepts to communicate about this shared reality (Sellars 1956).

Any answer to the Ontological Question should include these features as part of the answer as they seem essential to or at least proxies for something essential in strength's nature.

The answer to the Ontological Question we will defend is our Ontological Proposal:

Ontological Proposal: Strength is the general agentive ability to exercise difficult physical effort in central movement patterns.

To grasp the full extent of this answer which uses technical philosophical notions such as “general agentive abilities”, but also intuitive phrases which have a specific technical meaning, such as “difficult physical effort”, an exploration of some philosophical debates is necessary. This exploration provides the background to show that our answer aligns with the Historical intent and Salient features to adequately answer the Ontological Question. We begin by (2.1) elaborating on the philosophical understanding of general agentive abilities. Then (2.2) we present our understanding of physical effort. Finally (2.3), we present our Ontological Proposal as an adequate answer to the Ontological Question.

2.1 Ability

What is an ability? Prototypical examples are shooting a bow, reciting a monologue, or doing a backflip. Thus, abilities are things done by ‘agents’. These agents’ abilities are modal properties of these agents (related to their potential behavior) rather than ascribed behaviors done in any situation. Thus, to ascribe an agent the ability to shoot a bow, it is not necessary that they shoot the bow the moment we ascribe this ability. Hence Abilities are not categorical properties that are qualitatively present.² Beyond this framework there are three differentiations regarding

² This claim has to be taken as addressing the surface metaphysics of abilities. We intend to remain neutral on the deeper metaphysical question whether properties appearing modal have to be realized by modal categorical properties or may be grounded in modal properties on the most fundamental level (Armstrong, Martin, Place 1996; Mackie 1973, 1977, Prior et al.1982).

abilities. The difference between general and specific abilities (2.1.1), the graduality of abilities (2.1.2), and the difference between agentive and non agentive abilities (2.1.3.). We explore each in turn as it relates to strength to argue that it is an agentive ability that is gradable.

2.1.1 General and specific ability

Abilities are typically divided into two types: general and specific (also called local and global).

Mele suggests the difference between the two is that

“a general practical ability (...) is the kind of ability to A that we attribute to agents even though we know they have no opportunity to A at the time of attribution and we have no specific occasion for A-ing in mind. (...) [A] specific practical ability [is] an ability an agent has at a time to A then or on some specified later occasion (Mele 2003, 447).

The difference lies within the circumstances we expect an agent to exercise their ability. While there are no specific circumstances required for agents to perform general abilities, there are for specific abilities. Therefore, general abilities have modal reliability - they can be performed in a variety of circumstances. Specific abilities, however, are performed under specific circumstances (or Honoré 1964, Whittle 2010, Maier 2013). For example, the ability to shoot a bow (general ability) versus shooting a bow while balancing on a gymnastic ball in the rain.

An interesting implication of this differentiation is that an individual may have a general ability they cannot perform under certain specific circumstances necessary to categorise it as a specific ability (Beforsky 2001, 196). Thus, specific and general abilities may diverge. You may have the general ability to shoot a bow while lacking the specific ability to shoot a bow while balancing on a gymnastic ball; Yet specific abilities depend on general abilities.

2.1.2. Graduality of abilities

Abilities come in degrees. This is linguistically apparent when an individual is described as better at shooting a bow than another individual. But, does gradability extend to specific and general abilities equally?

If abilities can be graded, the question is how can they be graded? Per Jaster (2020), Milikan (2000, p.55) offers guidance, distinguishing between two types of “learning to do something better”. The first is learning how to perform a specific task at a higher level (making tighter turns while driving), while the second is learning to do the same task under more circumstances (turning while driving on a frozen road). Therefore, an ability’s grade can arguably have two dimensions 1) a dimension of achievement (doing better; an archer hitting the dead centre of a target) and 2) a dimension of reliability across circumstances (an archer simply hitting target, reliably, in various environments).

Finally, grading an ability is context sensitive. For example, while one might describe something as “small” without qualification, it is done so explicitly or implicitly with a context in mind. For example, a boxer may be described as a small heavyweight, but they may be larger than the average man or woman. We thus employ a relative standard, which is also done when describing an ability.

2.1.3. Agentive and non-agentive abilities

Abilities are agentive or non-agentive. Agentive abilities are actions. Actions are intended. Hence, their motivation is relevant. In contrast, non-agentive abilities are done, but lack intention. Digesting, for example, is a non-agentive ability.

Next we ask when does someone have an agentive ability? The more specific our philosophical model of agentive abilities, the better we can show our Historical Intent and Prevalent Features align with it, and the more informative our claim that strength is a specific

type of agentic ability. Therefore, we rely on Jaster's (2020) proposal, which provides the most careful and strong treatment of abilities known.

2.1.4 The Agents Ability Approach

Jaster (2020) in her account of abilities, takes a *success view*. To understand agentic abilities

Jaster claims that having an ability depends on success:

An agent S has an agentic ability to A if and only if S As in a sufficiently high proportion of the relevant possible situations in which she intends to A" (Jaster 2020, p. 94).³⁴

For example, a dart thrower has the ability to hit the bullseye only if she does so in a high proportion of her attempts. However, Jaster makes four important qualifications: the implications of this view for general and specific abilities, the role of proportions, relevant situations, and intention.

General and Specific Abilities: The success view assumes ascribing an ability depends on success in relevant situations, with relevance depending on context. General abilities must be successful across many broad contexts not interested only in highly specific situations. For example, the general ability of playing piano would mean someone can play many pieces under varying circumstances. Thus, general abilities are stable, depending on mostly intrinsic features across many possible, similar situations. Specific abilities, on the other hand, describe what the agent can do in a specific situation. A specific ability taking the success view, must be performed under a highly specific, extrinsic circumstance to determine the presence of the ability. The specific ability of playing Piano blind requires the modal base of the player regularly being blinded while playing, which is a feature external to the ability of piano playing generally.

³ Note that this is just the basic formulation of Jaster's (2020) idea. To handle specific problems she provides more detailed modifications throughout her book. For our purposes this initial version of her idea is sufficient.

⁴ To reach readers not trained in philosophy we briefly elaborate on the philosophical jargon. A, represents any potential action such as shooting, running, dancing etc. The use of A indicates the claim applies to a wide variety of cases, emphasising that it is a general point not specific to a certain kind of action.

Proportions: According to Jaster, we should think of the role of proportions as modal success rate: the ratio of situations in an agent's As succeed, in relation to the number of relevant situations in which the intention to A is present. This modal success rate should not be conflated with the real world quota of successful attempts. The modal success applies to all possible relevant situations in that the agent intends to A. Real world success quota, in contrast according to Jaster, is one's track record. The track record is the proportion of successful cases in relevant situations when the relevant intention was present. Such a track record usually is used pragmatically as a heuristic tool to determine the presence and achievement level of an ability because an individual's performance in all possible relevant situations is not possible to assess. Further, one's track record is context dependent. For example, being a good football striker does not require as impeccable a track record of goal scoring on an attack, as a surgeon needs to be considered a good surgeon.

Moreover degrees of competence scale both in terms of reliability and achievement - initially mentioned in 2.1.2. The reliability dimension perfectly fits Jaster's success approach, as an increase in ability indicates an agent can be successful across more potential situations. The achievement dimension, however, does not fit Jaster's view as well at first glance. The increase in achievement seems to be a qualitative rather than quantitative dimension of the action (such as the number of potentially relevant situations one succeeds in). The solution is *weighting*: different situations contribute to the success rate, but may be weighted so that they do not count equally. Therefore, performing the ability under certain circumstances or in a certain way makes the success more relevant to skill ascription. For example, someone playing a piano piece flawlessly and someone playing it with flaws both succeeded in playing the piano, but the flawless modal case is weighted higher, representing higher achievement. What makes skill performance qualitatively more relevant depends on the nature of the ability. Competence is thus not only the proportion of success, but the *weighted proportion*. Therefore, judging the

degree of an ability in Jaster's view scales with the weighted proportion of situations which an individual can perform an intended ability

Relevant Situations: Relevant situations that an agent can successfully perform the action are central to ascribing the ability. The nature of the ability determines which possible situations are relevant in its ascription. General abilities (i.e. shooting a bow) therefore have a broader scope than specific abilities which have narrower scope (i.e. shooting a bow with closed eyes).

Intentions: Jaster's approach assumes there is a link between the intention to *A* and effectively *A*ing. Intention in this context may be thought of as an action initiating propositional attitude; an attitude that is a causal antecedent of *A*ing relevant for *A*ing to occur, that content corresponds to the executed behavior we classify as *A*ing. While other motivating mental states such as desires are related to potential actions, only intention in Jaster's view initiates actions.

Understanding the nature of abilities satisfies one part of our Ontological Proposal (“Strength is the *general agentic ability to exercise* difficult physical effort in *central movement patterns*”) by clarifying what a general agentic ability is, per Jaster's view. Additionally, we provided an overview of the features present in the folk understanding of strength to support our forthcoming Ontological proposal, which also requires an understanding of physical efforts.

2.2 Effort

Efforts can occur in multiple contexts. People make financial (gathering investors for a new startup company), mental (solving a math problem), social (organizing neighborhood parents to clean up the playground), and physical efforts (lifting a heavy stone). Efforts can be mixed; sculpting a statue requires mental and physical effort. Though a theory of efforts is controversial (see. Bermudez & Massin 2022), we will proceed by pointing out generally accepted claims

about efforts in the debate (2.2.1) before focusing on physical efforts (2.2.2). Finally, we address how efforts relate to abilities (2.2.3).

2.2.1. General points on efforts

Efforts share common features independent of any specific theory of effort (Bermudez, Massin 2022). First, efforts are usually actions. As mentioned (section 2.1.3.) actions are intentional, i.e. agentive. Solving a math problem, organizing the neighborhood and lifting stones are actions. Non-agentive occurrences, things we do involuntarily, however, are not actions and therefore not efforts.

The second feature is that efforts are goal directed. We direct our financial effort *to* bring a new company into being, we direct mental effort to a math problem *to* solve it, we direct social effort to neighborhood organization *to* clean the playground. Therefore, an action without a directing goal is not an effort. Consider the movie character Forrest Gump when he stated “that day for no particular reason I decided to go for a little run.” If true, despite his run potentially being an action, it would not classify as an effort.

A third feature of efforts is their ethical significance. Massin wrote “we often judge that people deserve some retribution or compensation for their efforts (and conversely some blame for their lack of effort), and we try to inculcate in children the “taste for effort”.(Massin 2017, p. 230). Whether good or bad, we hold people accountable for their efforts. We pay and admire those who put great effort into things deemed good. We even say “while I don’t like what they did, I respect the effort they put into it.” In contrast, when someone fails to achieve a goal due to a perceived lack of effort, we ascribe more ownership of the failure to them, than if they failed while exerting all the effort they could. Indeed, the willingness to make an effort is considered a positive character trait many parents attempt to foster in their children.

Although sometimes argued as not metaphysically intrinsic⁵, the unpleasantness or difficulty of an action is often viewed as connected to efforts. In the debate on efforts, it is often emphasized that “Efforts are from their very nature more or less disagreeable” (Hearn 1864) or “Effort is only effort when it begins to hurt.” Ortega y Gasset (1949: 1170). The aversive aspect of effort contributes to making effort praisable, as it indicates discipline, willpower or the aforementioned positively viewed character trait of being willing to make an effort.

While there is some agreement on these general features of effort, more specific treatments of effort are debated (see Bermudez & Massin 2022 for an overview). However, our work is more limited, pertaining to physical effort as it relates to strength.

2.2.2. Physical Efforts

While there is no universally accepted definition of effort generally, recently the concept of physical effort became less ambiguous. Previously, physical effort was typically subsumed under general definitions of effort. However, the recent force-based account (Kruglanski et al. 2012; de Vignemont & Massin 2015; Massin 2017, 2022, 2024) specifically addresses physical effort, building on an earlier framework initially intended for general efforts.. While we adopt the force-based account to understand of the nature of physical effort, we aim to remain neutral on whether this account provides a viable general understanding of efforts, despite originally being introduced for that purpose.

According to Massin (2022), physical effort in the context of physical activity can be specified as follows:

⁵ Bermudez and Massin(2022, p.19) argue so by saying that “difficulty is no part of what efforts are, but nothing can be an effort without being difficult. This is in fact a quite standard view – albeit rarely explicitly spelled out – when it comes to the value of some mental states. Many agree that, as a matter of necessity, pain is intrinsically bad. Few agree however that pain’s badness is part of pain’s nature.”

defPhysical Effort: “to make a physical effort to move a body is to exert a force on it, directly or indirectly, in order to make it accelerate or stay at rest, this force being either uncounteracted or partly or fully counteracted by an opposite force – the ‘resistive force’” (Massin, 2022, p5).

Massin (2017) also introduces two gradable aspects of effort. The intensity of effort corresponds to the magnitude of the exerted force, while the strength of an effort corresponds to the magnitude of the part of the exerted force that is fully counteracted.

This notion of physical efforts, along with its sub-dimensions of intensity and strength, allows for several important distinctions concerning physical efforts, as highlighted by Massin (2022). First, it enables differentiation between success and failure: effort is successful if the goal is achieved due to the effect of the intended force without deviation; otherwise, it fails. Second, it allows differentiation between efforts and effortful actions. In the force-based account, effort is an intended action performed to cause a specific outcome. For example, pulling a rope to ring a bell is an effort. However, if we consider the outcomes of efforts as less basic actions—such as ringing the bell— this related action is an effortful action, but not an effort in itself. Ringing the bell, as opposed to pulling the rope, does not directly indicate the use of force. Thus, effortful actions are those that result from making an effort but are not efforts themselves.

Finally, the force-based account provides resources to better understand the relationship between physical efforts and their difficulty or unpleasantness. The claim is that an effort's difficulty is partly a product of the agent's ability to make the effort, which is influenced by agent-specific factors (health, motivation, fatigue) and situation-specific conditions (slippery surfaces, darkness), in addition to the effort's intensity t , i.e., the magnitude of the exerted force. For instance, “if two persons of the same strength, fatigue, skills, health, etc., make efforts of different difficulties, their efforts must have different intensities. The one who makes a more difficult effort overcomes greater resistance” (Massin 2024, 18).

This synthesis completes our discussion of effort, which was central in providing the

necessary information to understand the latter part of our Ontological Proposal (“Strength is the general agentic ability to exercise *difficult physical effort* in central movement patterns”); defining what a difficult physical effort entails. Further, this understanding provides an overview of the features that match the folk understanding of strength extracted from strongman to support the Ontological proposal.

2.3 Strength According to the Ontological Proposal

The condensed form of our claim is the synthesis of our discussions on Ability and Effort, the Historical Intent, and the Salient Features constituent in the folk ontology of strength in strongman:

Ontological Proposal: Strength is the general agentic ability to exercise difficult physical effort in central movement patterns.

The philosophical loaded terms “general agentic ability” and “difficult physical effort” are understood based on our earlier discussions:

General Agentic Ability: For an agent S to have an Ability A, exercising A (i.e., A-ing) must be intentional and succeed in a sufficiently high number of cases where S intends to A. Moreover, A-ing should be graded along a dimension of achievement (doing things better) and a dimension of reliability (rate of success).

Physical Effort: For A-ing to be a physical effort, it must be an intentional, goal-directed physical activity involving exertion of force against resistance. The intentional component entails identifiable cases of success and failure, and the focus on force means the excellence of a physical effort scales with the strength of the effort, considering the overall force required and the intensity of the effort under given circumstances. The higher the effort, the more it is praiseworthy.

These definitions inform a more detailed version of the Ontological Proposal which we will defend. We will call this Ontological Proposal*:

Ontological Proposal*: Strength is an agent's capacity to **a)** intentionally exercise force against an opposing force **b)** in a number of different circumstances **c)** with sufficiently high success cases, in that S actions align with the intended outcome. The Ability is thereby **d)** graded by the

additional measure of excellence for success cases. These measures are twofold: **d.1)** considering the overall force exercised as well as the **d.2)** relative force exercised, relative to additional factors, resulting in two dimensions of success. **e)** These two lines of excellence are praised as separate measures of excellence in strength assessment.

To defend the Ontological Proposal* as a proxy for the Ontological Proposal, requires that we map it on the folk ontology of strength, aligned with the Historical Intent and Salient Features outlined again below. Doing so demonstrates the Ontological Proposal is an adequate ontological characterisation of strength.

Historical Intent : The strongest can move or hold the heaviest weight.

Salient Features:i) Making the weight lifted transparent/objective (e.g. by using common objects or standardized equipment and events) ii) Performing multiple movement patterns across multiple events to assess strength. iii) Judging each event with point values that in sum determine who is the strongest.

Any answer to the Ontological Question should include these features as part of the answer as they seem essential to or at least proxies for something essential in strength's nature.

Each following aspect of the Ontological Proposal* shows that it matches the Historical Intent and Salient Features, proving it an adequate ontological characterisation of strength as understood in Strongman.

First, it appears prima facie safe that a) is fulfilled. Strength athletes lifting, holding, pushing, or swinging heavy objects do so intentionally, to achieve a goal. Their actions, involve exercising force against an opposing force, aligning with historical intent's focus on moving or resisting heavy weight.

Second, b) is satisfied considering Strongman and historical strength contests include multiple events where participants exercise force in different circumstances using various movement patterns. This aligns with salient features point ii).

Third, c) appears fulfilled in Strongman and other competitions, where standard movements are completed under load to a certain standard (e.g., a required finishing position in

a deadlift) with multiple attempts to demonstrate reliable performance. This aspect integrates SF point i).

Grading occurs in competition through measures of success, determining athletes' final competitive placing. This aligns with the distinctions in d1 and d2. In d1, the overall force applied is considered, contributing to the attribution of who is the strongest overall. The person showing the best overall strength performance is crowned the Strongest Man/Woman on Earth. Additionally, evaluations in line with d2 occur through athlete divisions based on sex, weight class, age, etc., determining the best strength performance within these strata. This covers SF point iii) and the latter part of HI's focus on the heaviness of the weight. Finally, the praise of excellence required by e) is evident, as winners receive titles, honors, prize money, and recognition within the strength sport community and, increasingly, the wider public.

In sum, the Ontological Proposal* maps conclusively with the salient features and historical intent of strength sports, particularly strength assessment in Strongman competitions. Thus, our understanding of strength seems supported. Strength is the general agentic ability to exercise difficult physical efforts by the execution of specific movement patterns.

3. The Objectivity and Pragmatics of Strength Assessment

Having considered the history of strength sports leading to the development of Strongman as a sociocultural effort to develop a method to determine who is the strongest, and having done the philosophical work to explicate the ontological understanding of strength in this context, a question remains. Even if we accept the general conceptualisation of strength that is prevalent in strongmen, does the sport provide a good tool to assess strength?

Perhaps there is a story to tell that puts this idea in question. In thinking about objective measures of strength it might be intuitive to focus on only a few lifts under standardized testing in contrast to the many events we see in strongman. Doing so, ironically, produces a distinct disadvantage that strongman tries to avoid, and this avoidance is one of the great merits of strongman. Strongman's popularity due to weightlifting, powerlifting, and bodybuilding's perceived failure to determine the strongest athlete, is a fitting story for the promotion of the sport. Yet, there is a case to be made that the professionalization of weightlifting, powerlifting, and bodybuilding led to specialized athletes less interested in the broad idea of strength and more focused on achieving the highest numbers in a few select lifts, or in the case of bodybuilding, purely using lifts to pursue hypertrophy for its own sake (Kind & Helms 2023). The related idea that measures can become worse over time is often raised in discussions ranging as wide as education to market regulation. Indeed, some argue that there might be a unified phenomenon called "proxy failure" (John et al., 2024).

The conditions for proxy failure require a "regulatory system with a goal will typically use a proxy (or set of proxies) to pursue it" while the "use of the proxy for regulatory feedback creates a pressure towards proxy failure, i.e., a pressure towards divergence between proxy and goal" unless there is a mechanism in place to prevent such a divergence (John et al., 2024, p. 4). In other words, if a proxy measure is used to improve performance, there will be an inherent pressure towards the proxy rather than the original target variable. The most often cited example for this is standardized testing in schools, which was implemented with the goal to improve educational outcomes and learning. Yet, many criticize that it led to students and teachers preparing for the test rather than learning itself. Professional weightlifting, powerlifting, and bodybuilding organizations establishing competitive rules recreated particular measures or sets of measures to improve comparisons of strength. Historically, there was complete overlap among athletes performing the lifts which are now organized into distinct sports. These athletes, now in separate sports, inevitably specialized, creating more and more divergence. Unlike these

sports, strongman is inherently more “counterbalanced or constrained by the system” (John et al., 2024, p. 4), since it relies on a significantly larger set of measures, variety, and rotation of strength tests that minimize the pursuit of specialization. This does not mean that strongman is inherently better than powerlifting, weightlifting, or bodybuilding. Rather, that the goals of these sports are more specialized and not widely deemed as proxies for determining who is the strongest (e.g., they might be argued as proxies for determining who has more specialized than general strength, or power and explosivity, or the aesthetic attributes associated with physical strength, rather than strength itself, respectively). It therefore seems that strongman's “strategy” of using a certain variety of movement patterns that arguably require the athlete to express different components of strength is a promising approach to address “overall strength” and to mitigate the risk of proxy failure more specialised strength sports face. However, the question remains, are strongman exercises varied enough to not replicate the same components of strength, just in multiple ways? To answer this question, we must turn to the quantitative, empirical realm of sport science.

3.1 A Quantitative, Empirical Perspective on Strength

Human movement is highly varied, but depends on quantifiable physiological characteristics of muscle, the forces muscle exerts on joints, and the eventual mechanical work – force multiplied by distance. In strength sport, work is transferred to implements with which a predetermined task is performed. The implement's mass, the distance it travels, the number of task repetitions, or in some cases, the time spent resisting the force it exerts on the body determines competitive outcomes. Muscles produce different actions depending on the force they produce relative to an external load. Concentric actions (where a muscle shortens) occur when the gravitational force exerted by an external load is less than muscle force, eccentric actions (where a muscle lengthens) occur when gravitational force exceeds muscle force, and isometric actions (where a

muscle stays at a constant length) occur when muscle and gravitational forces match (Herzog et al. 2015). While all human movement is produced by coordinated concentric, eccentric, and isometric actions across many muscles, Strongman/woman includes events where certain actions dominate. Deadlifts and atlas stone events primarily depend on concentric force production, as lifting loads from the ground to an erect position (concentric), rather than how long loads are maintained in that position (isometric) or how you lower the load (eccentric) dictates success. Likewise, vehicle pulls and pushes, and throwing events are primarily concentric. Eccentric actions occur as part of events requiring force absorption, such as multiple repetitions with implements supported by the body, such as squats or loaded-carry events such as farmers, yoke, stone or vehicle walks, or during changes of direction in loading medleys. Finally, the Hercules hold is a purely isometric event. Importantly, muscles have different concentric, eccentric, and isometric force production capacities, which change with the degree and sequence of these actions when coordinated (Douglas et al. 2017), as occurs in most human movement.

In all non-isometric events, implements move at a velocity dictated by the athlete's ability to overcome their inertia and accelerate their mass. Force is equal to mass multiplied by acceleration, so high force can occur when heavy loads are accelerated slowly or when lighter loads are accelerated quickly. The load velocity relationship demonstrates that the closer a load is to an athlete's maximal strength, the slower it moves (González-Badillo & Sánchez-Medina, 2010). Thus, Strongman/woman is a lower velocity activity relative to other sports. Sport science tests which assess peak force with maximal loads are considered tests of "maximal strength"; however, maximal strength can only be tested within the context of a given task (Buckner et al. 2017). Many applied tests overlap with strength sport, such as one-repetition maximum (1RM) tests on a given lift (e.g., a loaded back squat), and performance on these tests predict Strongman/woman event performance, especially in more "static" events like log press, atlas

stones, and tire flips (Hindle, 2019). Likewise, static events in strongman/woman where the heaviest single repetition decides the winner, are seen as the “purest” expression of strength.

Notably, there are laboratory-based tests which can assess strength with greater precision than a 1RM, that could be argued to be even “purer” tests of strength as their performance is less influenced by motor skill (i.e., how good of a squatter, bench presser, etc., the test taker is). However, despite measuring maximal strength, these tests do so in such a “sterilized” manner as to be quite divorced from strength sport. For example, like a squat 1RM, an isokinetic dynamometer can test maximal leg strength, but it might specifically assess the concentric-only, maximum knee-extension strength of the quadriceps, through a specific range of motion, at a specific angular velocity. While this test provides a peak torque value, representing maximum strength, if the muscle action, joint position, range of motion, or velocity were modified, it would be a different test of strength not necessarily having a strong relationship with other tests of strength (Warneke et al., 2023). Simply put, there is no single way to estimate or test strength, even using a more precise, “pure” laboratory-based test. Even if there were such a test, imagining a futuristic full-body scan which estimated the net force production capacity of all muscle fibers in the body, it would be so divorced from historical and sociocultural understandings of strength as to no longer resemble sport or strength performance. Further, it would lose the quality of being the general agentive ability to exercise physical effort. Thus, it ironically seems that strength sport’s purpose is not to test who is objectively the strongest *per se*, anymore than endurance sport’s purpose is to test who objectively has the most endurance. If that were these sports’ purposes, audiences would be satisfied watching strongmen pull on a static bar while standing on a force plate, or watching cyclists undergo VO₂ max tests on stationary bicycles, with winners determined by a readout on a computer screen. Therefore, despite sport performance and success being heavily reliant on objective, quantifiable outcomes, the role of sport science is not to replace strength sport, as it

has historical and philosophical underpinnings that must also be satisfied. Rather, sport science can inform how different qualities of strength can be tested.

Arguably, a series of events which determines who is the strongest needs to test different aspects of strength, including different muscle groups, muscle actions, and varying loads, resulting in different implement velocities, from slow, maximal force 1RM tests, to sustained force expression at moderate velocity testing “strength endurance” through repetitions, distance or time, to higher velocity “power” tests where lighter objects are thrown as high or far as possible. In aggregate, therefore, strongman largely seems to provide an “overall strength assessment” by testing athletes in events with distinct physiological and biomechanical underpinnings, such that it does not fall prey to proxy failure, arguably testing strength as a general ability to exercise a specific type of physical effort.

4. Conclusion

We do not want to suggest that the philosophical problem of what strength is has been settled. Instead, our aim was to convince our readership that there are philosophically interesting problems to be solved in this area. The nature of strength is complex, multifaceted, and plagued by trade-offs between different desiderata such as measurability, proxy failure, safety, robustness, and entertainment.

Indeed, one of the most important philosophical contributions of this paper is making the often implicit values/desiderata trade offs that occur more explicit. In order to answer difficult practical questions of how we should ideally design strongman competitions, we must understand these trade-offs better. Settling these once and for all can unfortunately not be done in a single paper. However, outlining the historical, philosophical, and quantitative physiological aspects of the question “what is strength?” may help Strongman stakeholders ensure that their

organisational decisions are well informed to help the sport grow and evolve in an intended manner, with respect to this question.

Further work on the nature of strength will have to be done and we hope that we have made some of the first successful steps towards this goal alongside the many strongman athletes and competition organizers that engage in this conceptual analysis and clarification process over recent decades.

Statements and Declarations

The authors have no conflicts of interest to declare.

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