



## What Is Strength?

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### ABSTRACT

We argue that physical strength is best understood, in philosophical terms, as the general agentive ability to exercise difficult physical effort. We develop this claim by examining the historically developed and paradigmatic test of overall strength: the sport of Strongman/woman. We identify the understanding of strength embedded in this sport and show how contemporary philosophical accounts of agentive ability capture its main features. Finally, we argue that Strongman/woman competitions are already well designed for assessing strength. By balancing the trade-offs involved in quantitative measurement, they provide a robust interdisciplinary tool for strength assessment.

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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 a controversy that engulfed the sport of Strongman/woman in 2017. That year, the World's Strongest Man (WSM) competition was won by Briton Eddie Hall over Icelandic athlete Hafþór 'Thor' Björnsson. Some fans, and even athletes, alleged that the contest organisers chose events which favoured Hall over Thor. Coupled with some contentious judging decisions, Hall's victory set the world of Strongman/woman alight ([BarBend 2017](#)). Was he the strongest man in the world or not? While the dispute between Hall and Thor eventually culminated in a professional boxing match between the athletes to settle it, the question itself deserves philosophical attention as it shows that fans, athletes and judges have an inherent philosophical interest not only in the definition of strength, but in how it is measured.

Although the importance of strength and exercise has been discussed in philosophy since ancient Greece, modern philosophy has paid surprisingly little attention to what strength is or how it should be evaluated.<sup>1</sup> To address this question, we consider one of two broad cultural practices used to identify the strongest: moving or resisting heavy objects, a practice represented today by Strongman/woman competitions such as WSM. The other is martial combat, now represented by boxing and mixed martial arts. Combat reflects a different conception of strength, one concerned with physically overpowering an opponent rather than general physical capability. Because our concern is with physical strength in this broader sense, we focus on Strongman/woman.

While our focus in this paper is on Strongman/woman, we argue for a more general understanding of strength than one limited to this sport only. Strongman/woman as a sport resulted from a century-long cultural development process aimed at addressing the question 'who is the strongest?'

Thus, the notion of strength at play seems to derive from a general, folk-ontological approach rather than a sport-specific one. This framework treats the history of strength assessment as a cultural evolution calibrated around a single, underlying folk understanding. Rather than viewing it as a series of disconnected conceptualizations, this approach aligns with how historians of strength and physical culture interpret the field. As we will discuss later in the paper, we remain committed to the idea of a unitary, rather than pluralist account of strength, of which our account thus accounts for the current state of this development.

Our approach to say something about the nature of strength along these lines deserves two methodological remarks. First, regarding our general methodology: in addressing the nature of strength by developing an understanding of how strength-ascribing judgments are made, we are following an approach we trace back to Lewis (1997), who, in his work on dispositions, defended the view that one can investigate the nature of a property by examining the truth conditions of its ascription. In Lewis's case, the question was what must be the case for it to be true that something has a given property—in our case, strength.<sup>2</sup> The second point is that the folk understanding of strength we seek to illuminate here is strength in a specific, physical, and global sense. It is the kind of strength we attribute to someone when we make a general remark that they are a physically strong person. With these clarificatory remarks out of the way, we will briefly outline the structure of this paper.

In Section 1, we outline the history of strength sports leading to modern Strongman/woman competitions which we use to inform our philosophical analysis. In Section 2, we further use this history to propose constraints for our proposal on the nature of strength, and provide an account

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1 A noteworthy exception is [Gugutzer \(2024\)](#). However, he does not focus on answering the question of what the nature of physical strength is. Rather, he presents an exclusively phenomenological meditation on a variety of phenomena he identifies as "strength phenomena" in sports. These include psychological strength, social strength, and bodily strengths, among others, indicating his broader scope of interest. His phenomenological interpretation of bodily strength describes it as a "vital driving force," experienced as a "felt-bodily experience of strength" ([Gugutzer 2024: 411](#)). While this approach may be compelling for those committed to phenomenology, we contend that the question "What is strength?" deserves a more substantial ontological answer.

2 It is important to note at this point that our analysis has a clear caveat. It is an analysis of strength that focuses on human strength in the context of human culture. Demonstrating how this understanding of strength could be extended to animals, or how it might need to be modified to encompass them, would require additional arguments that we do not provide in the present account.

of what strength is, matching these constraints. In Section 3, we discuss the problems of assessing strength and how Strongman/woman competitions provide a balanced pragmatic solution, showing that strength, as it is conceptualised herein, is epistemically accessible. In Section 4, we summarise our key arguments.

## 1. HISTORY OF STRENGTH SPORTS

The history of strength assessment leading to the development of modern Strongman/woman competition helps contextualise why the sport of Strongman/woman, 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. Specifically, the history of strength assessment leading up to Strongman/woman supports the notion that strength, as demonstrated in Strongman/woman, is not arbitrary, but a robust representation of the folk understanding of strength.

Records of strength training and competition predate the formalisation of strength competitions by several centuries. Often ‘pre-modern’ strength feats were performed 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 Topham lifted objects overhead, rolled pewter dishes using his bare hands and lifted heavy weights in a harness. No single object existed to prove one’s strength; rather, objects known to mass audiences were chosen to display strength in ways that conveyed the weight or impressiveness of the feat to the general public (Heffernan 2022; Kent 2012).

While no single object or lift ever universally typified strength, humans 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 centuries, squatting a heavy weight was added. Since then, these basic movement patterns hold largely true across the various strength sports which exist in the modern age (weightlifting, CrossFit, Strongman/woman, highland games etc.).

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 key institutional milestones. 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 2001). 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, *Ironman magazine*, then America’s most influential fitness publication, described this period 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).

However, things were about to shift after the 1950s. 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 lb 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/woman' competitions from the 1980s to present day.

During the 1970s, ABC produced a new, popular programme *Superstars*, inviting athletes from various sports to determine the best athlete across ten events that were unknown in advance. *Superstars* indirectly led to the creation of the WSM, or 'Strongman' (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. In this format, competitions were 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 often 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. While strength was traditionally judged solely by weight lifted or repetitions, the current system actually developed outside of conventional strength sports. Instead, it was introduced by its predecessor, *ABC Superstars*, which first implemented this scoring method. Notably, no alternative judging system has been seriously considered over the last fifty years.

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 standardised, revolving around stone lifts, overhead pressing, loaded carries, and heavy pulling, aiding Strongman's 'sportification' (Webster 1997). This evolution culminated in the 1997 World's 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.

A further evolutionary step for the sport took place in 2002 when Arnold Schwarzenegger and his business partner, Jim Lorimer, hosted their own Strongman/woman competition co-created with strength historians and competition organisers Terry Todd, Jan Todd, and David Webster, known as the Arnold Strength Summit (later Strength Classic). In Terry Todd's retrospective on the show, he discussed the critical split it caused in Strongman/woman (Todd 2002). On the origins of this show, he explained how he and the other organisers 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. Thus, they set out to determine who was stronger, who could lift 1,000 lb from the ground once, in contrast to a WSM event determining who could lift 800 lb 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. A further split occurred with the creation of a rival Strongman/woman competition by the International Federation of Strength Athletes (IFSA), in the early 2000s. While both competitions were similar in their structure, WSM athletes were not allowed to compete in the IFSA competition and vice versa (Heffernan 2022). However, both groups of athletes could compete at the Arnold. Anecdotally, the fan consensus indicated that the Arnold winner was the strongest man in the world, leading to a diminishing distinction between the competitions and the athletes who competed in them.

Modern Strongman/woman, although more sportified than in its early days, still operates on an entertainment/sport nexus while presenting itself as relying on the cultural lineage of strength performers. Modern Strongman/woman uses both single maximum lift attempts and maximal repetition efforts. Harking back to its show-business origins, these competitions also include distance events, such as 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. History comes into play as the WSM uses strength objects from the Ancient World such as heavy cauldrons in China ('ding lifting') and 'Apollon' wheels invented by French strongman Louis Uni in 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). This use of naming highlights the continually evolving use of history in Strongman/woman.

## 2. THE ONTOLOGY OF STRENGTH

With this historical and cultural context, we return to the question 'what is strength?', asking the concrete ontological question:

**Ontological Question:** *What is strength in Strongman/woman?*

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 dominate Strongman/woman events 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 standardised 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* and thus, to the question what strength in Strongman/woman is, should also be what makes these features essential to, or at least proxies for, 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 basic movement patterns.*

To grasp the full extent of this answer and its alignment with the *Historical Intent* and *Salient Features* requires a grasp of the philosophical understanding of 'general agentive abilities' and 'physical effort'. In the following sections we will therefore briefly elaborate on (2.1) general agentive abilities, (2.2) physical effort and then (2.3) show how this elaborated understanding supports our *Ontological Proposal* as an adequate answer to the *Ontological Question*.

### 2.1 ABILITY

What is an ability? Prototypical examples include shooting a bow, reciting a monologue, and performing a backflip. These are agentive abilities because their expression involves intentional action. Non-agentive abilities, such as digestion, do not involve intention and are not relevant here. Although abilities are expressed in actions, current debates treat them not as actions themselves but as modal properties of agents, concerning what those agents can do.<sup>3</sup> A person can therefore possess the ability to shoot a bow without exercising it at the moment the ability is ascribed. Two distinctions matter for our purposes: that between general and specific abilities, and the gradability of abilities.

<sup>3</sup> This claim must be taken as addressing the surface metaphysics of abilities. We intend to remain neutral on the deeper metaphysical question whether properties appearing modal must be realised by modal categorical properties or may be grounded in modal properties on the most fundamental level.

Abilities are typically divided into two types: general and specific. General abilities require no specific circumstances. Therefore, general abilities have modal reliability – they can be performed in a variety of circumstances. Specific abilities, on the other hand, require specific circumstances for their performance (Honoré 1964; Mele 2003; Whittle 2010; Maier 2013). For example, the ability to shoot a bow (general ability) versus shooting a bow while balancing on a ball in the rain (specific ability). An implication is that an individual may have a general ability (shooting a bow) but not a related specific ability (shooting a bow on a gymnastic ball in the rain) (Berofsky 2001: 196), while the inverse is not true. To have the specific ability to shoot a bow while balancing on a ball, you must have the general ability to shoot a bow.

Abilities, general or specific, come in degrees. This is linguistically apparent when an individual is described as *better* at shooting a bow than another individual. How can they be graded? Philosophers suggest two senses of ‘doing better’ that need to be distinguished in grading. The first is improvement or being able to perform a specific task at a higher level over time (an archer eventually being able to hit the dead centre of a target with practice). The second is reliability, defined as being able to perform the same task under various circumstances (an archer simply hitting the target, reliably, but in various environments) (Jaster 2020; Millikan 2000: 55). 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. If we consider someone a top archer in context of the World Archery Federation, this will ascribe a different level of ability compared being a good archer at a local archery club.

With a brief understanding of agents’ abilities, the differentiation between general and specific abilities, and how they can be graded along the achievement and generality dimensions, we will deepen the level of analysis. How exactly should we attribute someone an agentive ability? What are the adequate ascription conditions? This question was most carefully addressed by Jaster (2020).

According to her *success view* of ability ascription, an agent has the ability to do something if they can execute the relevant action in a sufficiently high proportion of relevant possible situations in which the agent intends to execute it (Jaster 2020: 94).<sup>4</sup> For example, a dart thrower has the ability to hit the bullseye only if she does so in a high proportion of her attempts. This straightforward idea has implications for when general and specific abilities can be ascribed to an agent. Specifically, to ascribe to an agent a general ability, they must succeed in its execution in a high proportion of contexts. However, to ascribe to an agent a specific ability, they must succeed at a high proportion only under the specific contexts of the relevant external conditions.

The proportion of successes, Jaster suggests, is best understood as modal success rates: the ratio of situations the agent succeeds in executing the relevant action, relative to the number of all possible situations in which they intend to execute the action. Since determining modal success rates which apply to all possible situations is pragmatically impossible, a track record – i.e. a real-world quota of successes in relevant situations – usually serves as the best proxy. How exactly this proxy is assessed is also context dependent. For example, being a good football striker does not require as impeccable a track record of goal scoring on an attack, but a surgeon needs a nearly impeccable track record to be considered a good surgeon.

Moreover, degrees of competence scale both in terms of reliability and achievement – the two earlier discussed dimensions of ability competence. The reliability dimension is met insofar as an agent executes their ability across more potential situations. However, the achievement dimension takes place qualitatively rather than quantitatively. For example, someone playing a piano piece flawlessly and someone playing it with flaws both succeed 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. Overall ability competence is thus

<sup>4</sup> 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.

not only the proportion of successes, but the *weighted proportion*. Therefore, judging the degree of an ability in Jaster's view scales with the weighted proportion of situations in which an individual can perform an intended ability.

## 2.2 PHYSICAL EFFORT

Though philosophical attempts to define efforts are diverse, they usually share some common features. They are actions involving intentions and are thus agential in the sense discussed earlier. Moreover, efforts are goal directed. Further, it is often argued that the difficulty of an action is connected to it being an effort. Thus, in principle, it seems possible that exercising physical effort can be an agential ability, as it is conceptualised as an agent's intentional action, meeting the requirements discussed in the last section. Therefore, we argue exercising difficult physical effort can be considered an agential ability – conceptually this claim seems sound.

While beyond this wide agreement there is no universally accepted definition of effort covering all types of effort (mental, financial, social, etc.), recently the concept of physical effort became less ambiguous due to the recent force-based work which specifically addresses physical effort (de Vignemont & Massin 2015; Kruglanski et al. 2012; Massin 2017; Massin 2024). While we think this account presents the most plausible specific account of physical effort to date, we remain neutral on whether this account provides a viable general understanding of efforts, despite originally being introduced for that purpose.

According to Massin (2024: 7), one of the defenders of this account:

making a physical effort to move a body is to exert a force on it, directly or indirectly, 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'.

The 'intensity' of an effort, he adds, then corresponds to the magnitude of the part of the exerted force that is fully counteracted.

This account of physical effort permits several important distinctions (Massin 2022). First, it enables differentiation between success and failure: effort is successful if the goal is achieved because 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 intentional 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.

Another benefit the force-based account provides is a better understanding of the relationship between physical efforts and their difficulty. 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 (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).

Massin's understanding of effort matches our attempt to account for strength, since its focus is on the exercise of force, which is arguably at the centre of what strength testing focuses on. Moreover, the built-in focus on intentional action, involving a natural way to determine successes and failures of an effort, and an agent-specific way to judge the relevant intensity of an effort based on the circumstances in which a subject executes the effort, makes this view especially attractive to our approach to consider strength as a form of ability which, as we discussed above, implies it to be tied to intentional action, the possibility to differentiate failure from success, and the importance of contexts of execution. Accordingly, alternative views such as Bermúdez's (2025) feelings-first view of physical effort, considering it in terms of purely subjective costs of

bodily action; Pageaux's (Bergevin et al. 2023) central motor command feedback view of effort; Hendrickx's (2024) view focusing on cognitive control as the hallmark of effort; or Bradford's (2015) primitivist view, which analyses effort purely as the experience of resistance, do not lend themselves to understanding physical effort in terms of the hallmarks of the ability for physical actions, as Massin's account does.

With a basic understanding of abilities and physical effort, we return to the initial reason for their introduction: to allow us to spell out the ontological proposal in meaningful philosophical detail.

### 2.3 SPELLING OUT THE ONTOLOGICAL PROPOSAL

As indicated at the beginning of this section, our *Ontological Proposal* is to understand strength. According to this proposal, strength is the general agentive ability to exercise difficult physical effort in basic movement patterns. In this proposal there are two philosophically loaded terms: 'General agentive ability' and 'difficult physical effort'.

For an agent to have a general agentive ability the agent must be able to exercise the relevant action intentionally and successfully in a sufficiently high number of cases under different circumstances. Moreover, their actions can be graded along a dimension of achievement (doing things better) and a dimension of reliability (rate of success). For the action to be a difficult physical effort it must also be a goal-directed physical activity involving exertion of force against resistance, whereas the difficulty of the physical effort scales with its intensity as defined above. The success of an effort is determined by its alignment with the original intention behind the action.

If we use these elaborations to expand our initial, short presentation of the Ontological Proposal, it results in the *Ontological Proposal\**. This proposal spells out what it means to have the general ability to exercise difficult physical effort, including the determinants of its evaluation picked from debates on ability and effort.

**Ontological Proposal\*:** Strength is a subject's modal property of (a) intentionally exerting force against resistance, (b) across a range of pragmatically relevant circumstances, and (c) with a sufficiently high success rate, where success consists in the subject's action matching its intended outcome.<sup>5</sup> Strength is graded by the overall intensity of successful efforts and by the intensity of those efforts relative to factors used to group comparable subjects, such as body weight, sex, and age.

With the detailed Ontological Proposal\* presented, we must back up this claim. Since we focused our understanding of strength on the folk ontological notion of strength, which we considered best embodied in Strongman/woman, we must show that this proposal aligns with the Historical Intent and Salient Features discussed in section 2.

Each aspect of the Ontological Proposal\* matches with the Historical Intent and Salient Features, showing it is an adequate ontological characterisation of strength as understood in Strongman/woman.

- 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 the Historical Intent's focus on moving or resisting heavy weight.
- Second, b) is satisfied considering Strongman/woman and historical strength contests include multiple events where participants exercise force in different circumstances using various movement patterns, aligning with Salient Features point ii).
- Third, c) appears fulfilled in Strongman/woman and other competitions, where specific movements are completed under load to a certain standard (e.g., a required finishing

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<sup>5</sup> We thank the reviewer for pointing out that this phrase may strike the reader as vague without context. For that context, we refer the reader to our discussion of the features of general abilities, based on Jaster's ideas, as well as to the dart-throwing example. There, pragmatically relevant differences are understood as the varying circumstances under which a certain feat may be performed.

position in a deadlift) with multiple attempts to demonstrate reliable performance. This aspect integrates Salient Features point i).

- Moreover, grading occurs in competition through scoring and ranking, determining athletes' final competitive placing. This aligns with the distinctions in c): 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 WSM or WSW.
- Additionally, evaluations in line with c) occur through athlete divisions based on sex, weight class, age, etc., determining the best strength performance within these strata. This covers Salient Features point iii) and the latter part of the Historical Intent's focus on the heaviness of the weight. Finally, the praise of excellence required by c) is evident, as winners receive titles, honours, prize money, and recognition within the strength sport community and, increasingly, the wider public.

In sum, the Ontological Proposal\* maps onto the Salient Features and Historical Intent of strength sports, particularly strength assessment in Strongman/woman competitions. Thus, our understanding of strength as a general agentive ability to exercise difficult physical efforts seems supported.

### 3. ALTERNATIVE PRAGMATIC AND SCIENTIFIC STRENGTH ASSESSMENTS

Having considered strength from a folk ontology perspective and its expression in Strongman/woman, a question remains. Even if we accept the conceptualisation of strength that is prevalent in Strongman/woman, does this conceptualisation carry over to an understanding of strength in other, broader contexts? Our understanding should at least approximate or relate to other conceptions of strength and their measurement, or our conceptualisation would be idiosyncratic and perhaps of little general interest outside of Strongman/woman. To assess whether Strongman/woman is well-calibrated as a broadly accepted conceptualisation of strength, we must consider objective measures of strength from standardised testing, present in pragmatic and scientific contexts.

Beginning with alternative pragmatic measures of strength, consider strength sports other than Strongman/woman that take a more focused approach with fewer events, such as weightlifting and powerlifting. These disciplines determine strength by the highest combined total of selected lifts. Weightlifting includes two overhead lifts, aligning with the Historical Intent in which overhead lifting has long been valued as a test of strength. Powerlifting includes the deadlift—one of the most basic historical feats of strength—and the squat, a more contemporary but widely accepted test.

Are these disciplines more parsimonious tests of strength? Answering 'yes' would require a conception of strength that differs from ours in one crucial respect: generality. On such a view, strength would be the ability to exert difficult physical effort in a narrow set of lifts. It would therefore constitute a specific rather than a general ability—namely, the ability to squat, bench press, deadlift, snatch, or clean and jerk a barbell to competition standards.

To clarify why we regard Strongman/woman rather than the barbell disciplines as emblematic of strength, we must consider the trade-offs involved. Basing strength on these highly specific tests introduces a disadvantage best understood as 'proxy failure' (John et al. 2024): when a measure used to track a goal increasingly diverges from that goal. As John et al. note, regulatory systems pursue goals via proxies, but feedback based on the proxy creates pressure toward divergence unless counterbalanced. The familiar example is standardised testing: introduced to improve education, it often incentivises teaching to the test rather than learning itself.

Weightlifting and powerlifting exemplify this dynamic. Their rules tightly specify what counts as a valid lift. In weightlifting, a snatch or clean and jerk is invalid if there is a 'press-out'; elbows must be locked upon receiving the bar overhead (IWF 2025). An athlete may be strong enough to press the bar to full extension, yet still fail under competition standards. In Strongman/woman, by contrast, overhead lifts are valid so long as the weight is brought to full extension overhead, regardless of

whether the athlete uses a strict press, leg drive, or a jerk. Similarly, powerlifting deadlifts prohibit ‘hitching’ (IPF 2025), whereas Strongman/woman permits it so long as the weight is lifted from the floor to full extension. Moreover, weightlifting (two lifts) and powerlifting (three lifts) involve far fewer competitive movements than Strongman/woman.

Thus, elite weightlifters and powerlifters demonstrate strength under narrower and more constrained conditions. Strongman/woman, by contrast, employs a broader and rotating set of events, reducing specialisation and thereby functioning as a system more effectively ‘counterbalanced or constrained’ (John et al., 2024: 4). It is therefore arguably less susceptible to proxy failure.

This does not imply that Strongman/woman is superior as a sport. Rather, it plausibly provides a more global pragmatic measure of strength suited to the question ‘Who is the strongest?’ By incorporating varied movement patterns, muscle groups, loads, velocities, and implements beyond the barbell, it requires athletes to display a wider range of strength capacities. For this reason, we regard it as a promising candidate for measuring ‘overall strength’ while mitigating the proxy risks inherent in more specialised disciplines.

Even so, a further question remains: are Strongman/woman events in fact good general measures of strength? To address this, we must turn to the quantitative, empirical domain of sport science.

### 3.1 THE EMPIRICAL PERSPECTIVE ON STRENGTH

Human movement is highly varied but grounded in quantifiable muscular properties: fibre metabolic characteristics, muscle length at contraction, joint angle, and the force exerted at those angles, producing mechanical work (force × distance). In strength sport, this work is transferred to implements to complete predefined tasks. Competitive outcomes depend on implement mass, displacement, repetitions, or, in some events, the time resisting its force.

Muscles act concentrically (shortening) when muscle force exceeds gravitational force, eccentrically (lengthening) when it does not, and isometrically when forces match (Herzog et al. 2015). Although all movement involves coordinated combinations of these actions, certain Strongman/woman events emphasise particular ones. Deadlifts and atlas stones primarily require concentric force, as success depends on lifting the load rather than maintaining (isometric) or lowering (eccentric) it. Vehicle pushes, pulls, and throws are likewise predominantly concentric. Eccentric actions feature more prominently in repeated squats, loaded carries (farmers, yoke, stone, vehicle walks), and medleys involving deceleration or direction changes. The Hercules hold is purely isometric. Importantly, concentric, eccentric, and isometric capacities differ and interact depending on their sequencing (Douglas et al. 2017).

In all dynamic (non-isometric) events, implement velocity depends on overcoming inertia. Since force equals mass × acceleration, high force may arise from slowly accelerating heavy loads or rapidly accelerating lighter ones. The load-velocity relationship shows that loads closer to maximal strength move more slowly (González-Badillo & Sánchez-Medina 2010), making Strongman/woman relatively low-velocity compared to many sports. Sport science typically assesses ‘maximal strength’ via peak force against maximal loads, but always within a specific task (Buckner et al. 2017). Common applied measures—such as one-repetition maximum (1RM) tests—overlap with strength sport and predict performance in dynamic Strongman/woman events like the log press, atlas stones, and tire flip (Hindle et al. 2019). Historically and culturally, such maximal single lifts are often regarded as the ‘purest’ expressions of strength.

However, sport science defines strength differently. Knuttgen and Kraemer (1987) define it as ‘the maximal force a muscle or muscle group can generate at a specified velocity.’ This definition implies that strength is (1) muscle- or synergy-specific, (2) velocity-specific (including isometric conditions), and (3) a muscular property rather than a movement performance. Laboratory tests that isolate specific muscles at controlled velocities minimise motor skill and may therefore count as ‘purer’ tests. By contrast, strength sport demonstrations—though they involve maximal force at load-dependent velocities—are embedded in skilled tasks. A squat or deadlift 1RM reflects not only lumbar strength but also hip and knee strength and technical proficiency. Indeed, competitive and

non-competitive powerlifters with substantially different squat 1RMs have shown similar isolated lumbar isometric strength (Androulakis-Korakakis et al. 2021).

Thus, even when measuring the same muscle, differences in joint angle, velocity, and movement context yield distinct ‘strength’ tests. For this reason, contemporary sport science does not recognise a single measure of ‘global strength’ and emphasises context specificity (Warneke et al. 2023). Seemingly related performances may not strongly correlate, illustrating again the risk of proxy failure. For example, athletes with more type IIx fibres may share similar squat 1RMs (a slow-velocity task) with others, yet produce greater high-velocity power (Fitts et al. 1991; Machek et al. 2020). Likewise, limb proportions alter joint angles and muscle lengths, affecting actin–myosin overlap and elastic contributions (Rassier et al., 1999). Even absent motor skill, strength expression varies with muscle physiology, velocity, joint angle, and tendon properties, rendering a fully sanitised global test elusive.

Even if such a test were conceivable—imagine a full-body scan calculating total fibre force capacity—it would be so detached from historical and sociocultural conceptions of strength as to cease resembling sport. It would also abandon strength as an agentive capacity to exert physical effort. Strength sport no more aims to identify the objectively strongest organism than endurance sport aims to identify maximal physiological endurance in abstraction. Spectators would hardly prefer force-plate pulls or  $\text{VO}_2$  max readouts to embodied competition. Sport science therefore does not replace strength sport; rather, it clarifies how particular strength qualities can be measured.

If determining ‘who is the strongest’ requires assessing multiple dimensions—muscle groups, ranges of motion (and thus muscle lengths and joint angles), contraction types, loads, and velocities—then a composite approach is needed. This includes slow, maximal-force 1RM efforts; repeated or sustained efforts indexing strength endurance; and higher-velocity tasks testing power. In aggregate, Strongman/woman approximates such an overall strength assessment by integrating events with distinct physiological and biomechanical demands. It thereby mitigates proxy failure and plausibly captures strength as a general ability to exert a characteristic form of physical effort.

## 4. CONCLUSION

We are not suggesting that the philosophical problem of what strength is has been settled. Instead, our aim was to convince readers 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 to make the often-implicit values/desiderata trade-offs that occur more explicit. To answer difficult practical questions of how we should ideally design Strongman/woman 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/woman 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 we have made some of the first successful steps towards this goal alongside the many Strongman/woman athletes and competition organisers that engaged and continue to engage in this conceptual analysis and clarification process in recent decades.

## COMPETING INTERESTS

The authors have no competing interests to declare.

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