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The internal structure of dual character concepts: A corpus-based study of scientist

(La estructura interna de los conceptos de doble carácter: Un estudio basado en corpus de científico)

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Keywords

Dual character concepts
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ABSTRACT: Over the past decade, there has been a growing interest in dual character concepts (DCCs). These concepts are defined by their internal structures, which consist of two distinct dimensions: a descriptive and an independent normative dimension. However, a more in-depth exploration of their internal structures is still needed. This article examines the internal structure of one DCC that has garnered significant attention in the literature, SCIENTIST. First, I analyze the components of the different dimensions of this concept. Second, I explore the interaction between these two dimensions. To do so, I investigate SCIENTIST in the enTenTen20 corpus using Sketch Engine, focusing on the expressions "good scientist" and "true scientist", as the literature suggests they interact more directly with the descriptive and normative dimensions, respectively. The findings from this investigation offer valuable insights for studying other DCCs, as the results suggest, among others, the following key points: first, that the complexity of the two dimensions of SCIENTIST is greater than previously recognized; and second, contrary to what is agreed, both the descriptive and the normative dimension interact with "good" and "true," which implies that both expressions can be used to make the two types of normative evaluation proper of DCCs.

Palabras clave

Conceptos de carácter doble
Dimensión descriptiva
Dimensión normativa
Filosofía experimental
Métodos de corpus

RESUMEN: Durante la última década, ha habido un interés creciente en los conceptos de carácter doble (CCDs). Estos conceptos se definen por sus estructuras internas, que constan de dos dimensiones distintas: una dimensión descriptiva y otra dimensión normativa independiente. Sin embargo, todavía es necesaria una exploración más profunda de sus estructuras internas. Este artículo examina la estructura interna de un CCD que ha suscitado gran atención en la literatura, CIENTÍFICO. En primer lugar, analizo los componentes de las distintas dimensiones de este concepto. En segundo lugar, exploro la interacción entre estas dos dimensiones. Para ello, investigo CIENTÍFICO en el corpus enTenTen20 utilizando Sketch Engine, centrándome en las expresiones "buen científico" y "verdadero científico", ya que la literatura sugiere que interactúan más directamente con las dimensiones descriptiva y normativa, respectivamente. Los resultados de esta investigación ofrecen información valiosa para el estudio de otros CCDs, ya que los resultados sugieren, entre otros, los siguientes puntos clave: en primer lugar, que la complejidad de las dos dimensiones de CIENTÍFICO es mayor de lo que se había reconocido anteriormente; y en segundo lugar, en contra de lo que se piensa, tanto la dimensión descriptiva como la normativa interactúan con "bueno" y "verdadero", lo que implica que ambas expresiones pueden utilizarse para realizar los dos tipos de evaluación normativa propia de los CCDs.

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1. Introduction

Over the past few decades, there has been a growing interest in those concepts whose meaning combines descriptive and non-descriptive features. Thick concepts (see Williams, 1985; Dancy, 1995; Väyrynen, 2011, 2013; Kirchin, 2013) represent perhaps the most well-known and extensively studied example. However, in the last ten years, dual character concepts (henceforth, DCCs) have also garnered significant attention (see Knobe *et al.*, 2013; Del Pinal & Reuter, 2017; Reuter, 2019; Phillips & Plunkett, 2023). According to Knobe *et al.* (2013, p. 243), DCCs "involve two ways of characterizing their instances, and thus two ways of determining category membership." First, a set of specific features; second, an underlying abstract value. In other words, the internal structure of DCCs is composed of two different dimensions. A paradigmatic example of a DCC is the concept SCIENTIST,[1] since most authors discussing the meaning of DCCs focus on this concept. As explained, SCIENTIST encompasses concrete features such as "Conducting experiments, Analyzing data, Developing theories, Writing papers" (Knobe *et al.*, 2013, p. 243) and also an abstract value like "the pursuit of scientific knowledge" (Knobe *et al.*, 2013, p. 243) or "the quest for impartial truth" (Del Pinal & Reuter, 2017, p. 479).

An important feature of DCCs is that the two dimensions are related but independent (Knobe *et al.*, 2013, 243; Del Pinal & Reuter, 2017, pp. 477, 492; Reuter, 2019, p. 1; Guo *et al.*, 2021, p. 2). This means someone can be considered a scientist according to the descriptive dimension (if s/he possesses the concrete features), but not according to the normative dimension (if s/he does not instantiate the abstract value), and vice versa. For example, take Emma, an astronomer who spends a lot of time gathering data and conducting experiments, but solely to enrich herself. Despite her specific motives, we would still say that Emma is a scientist because her professional activities include many tasks typical of a scientist. In this sense, Emma only fulfills the descriptive dimension. Now consider Peter, who has never received scientific training, but his life is deeply rooted in the pursuit of objective truth. In this case, we might say that, even though Peter does not perform any of the tasks usually performed by scientists, Peter is a scientist because his way of life aligns with the abstract value that defines a scientist. In this sense, Peter only fulfills the normative dimension. Before proceeding, a brief clarification is in order.

DCCs are concepts, and concepts can be defined in different ways. The most widespread position on DCCs is the so-called "lexical-semantic view," (Baumgartner, 2024, p. 727) which argues that DCCs are lexical concepts. One of the most defining features of lexical concepts is that they are elements of mental grammar, i.e., mental representations (Fodor, 1975); in other words, they "are abstractions over multiple instances of language use." (Evans, 2009, p. 128). However, concepts can also be defined as abstract objects or Fregean senses (Frege, 1891/1997, 1892/1997). A final option is to say that concepts are abilities (Wittgenstein, 1953; Kenny, 2010). That is, someone possesses the concept CAT when she has mastered the rules for using the word "cat."

My approach is grounded on ordinary language philosophy (Wittgenstein, 1953; Austin, 1962) for several reasons, the most important of which is that I do not want my thesis or my theories to lose sight of the phenomenon I want to study. As Baz (2012, p. 4) highlights, not paying attention to the real use of the terms we are interested in, "the philosopher risks having his theory lose contact with the world it is supposed to help us illuminate." Consequently, instead of looking for the meaning that allows us to determine the circumstances of application of a word, I examine the usages to determine the meaning of the word. Since this paper focuses on language use —specifically, how competent speakers use expressions like "scientist"— I adopt the third perspective on concepts, concepts as abilities. In this view, a DCC like SCIENTIST is simply the ability to apply the term "scientist" according to the rules of use established within a linguistic community. Mastering these rules likely involves a broader range of uses than those required for purely descriptive concepts (e.g., ROUND), as the former, unlike the latter, encompasses both descriptive and normative uses. In other words, there will be cases where something can be considered a scientist without possessing the descriptive features

[1] I follow the practice of using small caps for concepts.

(or, if you prefer, without fulfilling the descriptive dimension) and cases where something can be considered a scientist without possessing the normative features (or, if you prefer, without fulfilling the normative dimension).

There has been much progress focusing on DCCs since they have been used to shed light on different topics, for example, gender terms and generics (Leslie, 2015; Guo *et al.*, 2021), natural kind terms (Tobia *et al.*, 2020), personal identity (Knobe, 2022), art (Liao *et al.*, 2020), or law (Flanagan & Hannikainen, 2022; Almeida *et al.*, 2023). However, many questions remain about their internal structure, such as which components comprise the descriptive and normative dimensions, and how these two dimensions interrelate. In this regard, Phillips & Plunkett (2023, p. 341) say that "a key debate is about what exactly the "internal structure" of dual-character concepts consists in." In a similar vein, Reuter (2019, p. 4) notes that "[w]hereas many controversies remain in regard to detailing the normative content of dual character concepts, a further issue arises as to if and how strongly both dimensions interact."

This paper explores the internal structure of DCCs, aiming to illuminate the interplay between the descriptive and the normative dimensions. I will use the concept SCIENTIST as a model. First, I will analyze the components of the different dimensions of this concept, assessing how well the elements identified in the literature represent it. Second, I will investigate the interaction between these two dimensions. Rather than employing questionnaires, the most widespread methodology in experimental philosophy and studies on DCCs, I will use corpus methods. Specifically, I will examine the concept SCIENTIST in the enTenTen20 corpus (see Jakubíček *et al.*, 2013) in Sketch Engine, searching for the expressions "good scientist" and "true scientist", as the literature suggests they interact more directly with the descriptive and normative dimension, respectively.

I proceed as follows: Section 2 introduces DCCs, focusing on various proposals for operationalizing the two dimensions. Section 3 details the methods and materials used in the study. Section 4 presents the results of the corpus analysis for the expressions "good scientist" and "true scientist." Finally, Section 5 discusses the significance of the results for the literature on DCCs.

2. Explaining the two dimensions of DCCs

There are different proposals on how to operationalize the two dimensions of DCCs. Knobe *et al.* (2013) identify the descriptive dimension with a set of concrete or specific features and the normative dimension with an underlying abstract value. If you were to ask someone what it means to be a scientist, they would most likely start by giving you a list of concrete features that most scientists tend to exhibit, for example, postulate hypotheses about some phenomenon, collect data to perform experiments to prove or disprove such hypothesis, or write journal articles to disseminate the results. However, as Knobe and his colleagues point out, this list of concrete features would not be arbitrary, but would all be related to the same abstract value, in this case, something like the search for objectivity or unbiased truth. In short, speakers associate with DCCs certain concrete features that together they realize an abstract value.

Leslie (2015) and Del Pinal & Reuter (2017), however, focus on social roles, linking the descriptive dimension to typical functions of a role (e.g., a scientist learns mathematics or conduct experiments) and the normative dimension to idealized functions of a role (e.g., a scientist seeks objective knowledge or impartial truth).[2]

As mentioned in the Introduction, one of the defining features of DCCs is that the two dimensions are related, but independent. This means that while there is a connection between the descriptive and the normative dimension, an indi-

[2] It should be noted that, although both focus on the idea of social roles, there are differences between the two proposals. For Leslie (2015, p. 130), if someone "is a member of a social kind, and that social kind has a particular primary role or function, then there is a prima facie obligation to fulfill that role or function." However, for Del Pinal & Reuter (2017, p. 479), "what matters most is not whether someone actually fulfills the basic function to some non-trivial degree, but rather whether someone is committed to fulfill it."

vidual does not need to exhibit characteristics of both to be classified under a particular DCC.[3] Remember our example of Emma and Peter. Emma exclusively exhibited characteristics of the descriptive dimension, yet we still considered her a scientist. Conversely, Peter exclusively exhibited characteristics of the normative dimension, yet he too was considered a scientist.

Although more evidence is needed on how the two dimensions interact, several proposals in this regard can be found in the literature. Firstly, the two-senses approach states that people display a specific intuition pattern, showing they have two different characterizations for DCCs (for example, SCIENTIST), but not for single character concepts (for example, OPTICIAN). According to the proponents of the two-senses approach, it is obvious that the following conversation is commonplace:

1) Peter: Emma is not a scientist. I know that many people think she is a scientist, but, if you think about what it really means to be a scientist, she's not a scientist.
2) Maria: How can you say that Emma is not a scientist? She works in a lab and spends her days conducting experiments.
3) Peter: Okay, that's not what I meant. What I'm trying to say is that her actions are not driven by a genuine, impartial pursuit of knowledge. The only thing that matters to her is money.

However, according to the proponents of the two-senses approach, similar conversations involving single character concepts do not sound natural. Consider the same conversation but with SCIENTIST replaced by OPTICIAN, a single character concept:

4) Peter: Emma is not an optician. I know that many people think she is an optician, but, if you think about what it really means to be an optician, she's not an optician.
5) Maria: How can you say that Emma is not an optician? She works in an optician's shop and spends her days conducting eye exams.
6) Peter: Okay, that's not what I meant. What I'm trying to say is that she is not motivated to help humanity to see things in a better light. The only thing that matters to her is money.

According to the two senses approach, most people would accept 1)-3), but would not accept 4)-6). This is because SCIENTIST, unlike OPTICIAN, is a DCC. In this sense, and since the two dimensions of DCCs are independent, they "allow for a double-dissociation in categorizations, such that descriptive categorizations may fail to align with normative categorizations" (Baumgartner, 2024, p. 728). That is, although the two dimensions often overlap, it is possible, depending on the features of the object to be categorized, to reach dissociated categorization judgments. Consider the following example:

7) My cousin Peter is 6 years old, and he is already a true scientist; not like Yoshihiro Sato.

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[3] Some studies show that the two dimensions are not totally independent. For example, Baumgartner (2024) shows that the abstract values of the normative dimension have another function beyond the categorization function mentioned in the literature, "the *injunctive function* of the normative dimension," which determines what should count as a member of the category. Regarding the categorization function, both dimensions are independent; something can be a member of the category not fulfilling the descriptive criteria. Remember Peter in the Introduction's example. He has not met any of the descriptive criteria, but still, he is a scientist. However, regarding the injunctive function, something cannot be a member of the category if it does not fulfill the descriptive criteria. Remember now Emma in the same example and think if it makes sense to say of her that she ought to be a true scientist. Now, would still be ok to say the same of Emma supposing she would not have met the descriptive criteria? The answer is in the negative. This shows that "injunctions based on the normative dimension of dual character concepts are dependent on descriptive class membership." (Baumgartner, 2024, p. 478).

Someone who utters (7) would say that Peter is a scientist because he fulfills the normative dimension, even though he does not fulfill the descriptive dimension. At the same time, they would say that Yoshihiro Sato is not a scientist because, although he fulfilled the descriptive dimension, he did not fulfill the normative one.

Secondly, several authors argue that while the normative dimension interacts with modifiers like "true" or "real," it does not seem to interact with modifiers such as "good." Leslie (2015, p. 117) observes that "it is natural to suppose that the adjectives "true" and "real" tend to select the normative sense." In a similar vein, Del Pinal & Reuter (2017, p. 479) say that "modifiers such as *true* in colloquial expressions such as *John is not a true father*, [...] seem to operate (not necessarily exclusively) on this normative dimension." Liao *et al.* (2020, p. 108) suggest that "[i]n general, one can pick out this second criterion [the abstract values] by adding the modifier 'true'." Guo *et al.* (2021, p. 7) explore "whether gender concepts resemble dual-character concepts in the extent to which they can be described with "true" (a true man), which concerns abstract traits, as well as "good" (a good man), which concerns concrete traits." Flanagan & Hannikainen (2022, p. 169) defend that "most people have been found to agree that a postdoctoral researcher who is employed to run experimental studies but who is completely uninterested in her findings is clearly a scientist in some sense but is not a true scientist at all." Finally, Baumgartner (2024, p. 728) says that "specific modifiers like "true" or "truly" (and to a lesser extent "real/really") can be utilized to highlight the normative dimension of terms expressing dual character concepts." To illustrate, consider the following sentences:

8) Emma is a good scientist.
9) Emma is a true scientist.

Someone who utters 8) will communicate that Emma possesses certain characteristics necessary for proper scientific practice, for example, the analysis of data or the conducting of experiments. However, someone who utters 9) will communicate that Emma's way of life is in line with an abstract value to whose attainment the scientific practice is oriented.

In summary, there are two different normative evaluations associated with DCCs, which can be highlighted by using the expressions "good" and "true," and, from these two expressions, the latter is often used to highlight the normative dimension. However, as discussed above, further studies investigating the specific composition of these two dimensions or how they interact are needed.

This study fills this gap by focusing on a specific DCC, SCIENTIST, empirically investigating their two dimensions through the expressions "good scientist" and "true scientist." A significant finding from the present study is that, contrary to what is widely agreed, both the descriptive and the normative dimension interact with "good" and "true," which implies that both expressions can be used to make the two types of normative evaluation. However, before detailing the results of the analysis, in the next section, I will present the methods and materials used for this purpose.

3. Methods and Materials

The use of linguistic corpora in analytic philosophy has been defended in recent years (see Bluhm, 2013, 2016; Caton, 2020). Besides, analytic philosophers have fruitfully used corpus methods to investigate different philosophical topics, for example, the role of intuitions (Andow, 2015a, 2015b; Ashton & Mizhari, 2018; Bordonaba-Plou, 2021), the philosopher's use of "know" (Hansen *et al.*, 2021), meta-argumentation (Hinton, 2021), causal attributions (Sytsma *et al.*, 2019), mathematical explanation (Mejía-Ramos *et al.*, 2019), the expression of values in obituaries (Alfano *et al.*, 2018), or the insularity of Anglophone philosophy (Schwitzgebel *et al.*, 2018), among others.

As said in the Introduction, this work investigates the internal structure of SCIENTIST by examining how competent speakers employ "scientist." To accomplish this, I will perform a corpus analysis of the expressions "good scientist" and "true scientist" in the enTenTen20 corpus (see Jakubíček *et al.*, 2013) in Sketch Engine. The enTenTen20 is a sam-

ple corpus, meaning it aims "to represent a particular type of language" (McEnery & Hardie, 2012, p. 8); in this case, the English language. Its size is enormous, 36 billion words, featuring a diverse range of texts, including technology, sports, society, science, health, games, business or art, among others. The minimum size of a corpus is a matter of discussion. Some authors think that the ideal size, even for general corpus, should be one million words (McEnery & Wilson, 2001, p. 30). However, other authors (Church & Mercer, 1993; Sinclair, 2004) argue that there is no minimum size; the larger the corpus, the better. In this work, I follow these last authors. The enTenTen20 corpus is much larger than other general corpora commonly used such as the COCA corpus[4] (1 billion words) or the BNC corpus[5] (100 million words). All these features guarantee the balance and representativeness of the corpus.

In this study, I use corpus methods to investigate the internal structure of SCIENTIST.[6] Specifically, I conduct two distinct analyses: a collocation analysis (see Hunston, 2002, p. 68; Baker *et al.*, 2013, p. 36) and a KWIC analysis (see Hunston, 2002, p. 39; McEnery & Hardie, 2012, pp. 35-37). Firstly, I examine the most frequent collocates of the expressions "good scientist" and "true scientist." Collocates are the words that occur "frequently within the neighborhood of another word, normally more often than we would expect the two words to appear together because of chance" (Baker *et al.*, 2013, p. 36).

For the collocation analysis, I use a 5:5 span, which signifies that I consider words appearing within five words to the left and five words to the right of the node (i.e., the query term, in this case, "good scientist" and "true scientist"). Additionally, I set a minimum frequency in corpus of five, i.e., only collocates appearing at least five times in the corpus will be included, and a minimum frequency in span of three, i.e., only collocates appearing at least three times within the indicated span will be included. To estimate the statistical significance of the collocates, I used the Mutual Information score (or MI score). The "MI-score indicates the strength of a collocation. [...] In other words, the MI-score measures the amount of non-randomness present when two words co-occur" (Hunston, 2002, p. 71).[7]

By examining collocates, we can discern patterns in the usage of a given term. My focus will be on the top 20 statistically significant collocates. As will be seen in Section 4, considering the top 20 collocates suffices to yield a substantive and comprehensive depiction of the concept's structure. The goal of this collocation analysis is to identify terms that frequently appear with "good scientist" and "true scientist," directly revealing both concrete features and abstract values. For example, one of the most frequent collocates of "true scientist" is "humility," which represents an abstract value. Furthermore, among the top 20 collocations of "good scientist" and "true scientist," some terms may not explicitly denote concrete features or abstract values but still imply them. For instance, "hallmarks" ranks as the fourth most frequent collocate of "good scientist," as seen in phrases like "one of the hallmarks of a good scientist is ..." or "these are the hallmarks of a good scientist: ...," which are common in the corpus. Examining the contexts in which "hallmarks" appears can thus provide insight into the concrete features and abstract values typically associated with "good scientist" and "true scientist."

The KWIC analysis is designed to analyze the contexts of this second type of collocation. A KWIC analysis shows the searched word (or node), for example, "hallmark" or "hallmarks," surrounded by its context. I reviewed all instances of these collocates,[8] and manually extracted the associated concrete features and abstract values. In other words, this part of the analysis is interpretative and entirely qualitative, since the determination of what counts as a concrete feature or as an abstract value depends almost exclusively on my qualitative interpretation of each context.[9] For example, by inspecting the contexts in which "hallmarks" appears as a statistically significant collocation of "good scientist" and

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4 https://www.english-corpora.org/coca/.

5 https://www.english-corpora.org/bnc/.

6 All the searches were conducted between June 1, 2023, and July 14, 2023.

7 An MI score higher than 3 is considered significant (see Hunston, 2002, p. 71; Baker, 2006, p. 101).

8 For a detailed analysis of the collocations used in the analysis, see Section 4.2.

9 Perhaps it could be thought that the combination of quantitative and qualitative methods is not desirable. However, both methods are not only compatible, but also complementary (see Bordonaba-Plou, 2022).

"true scientist", we can identify different concrete features and abstract values. To illustrate this, consider the next examples:

10) One of the hallmarks of a good scientist is understanding his or her data.
11) Objectivity, scrupulous attention to details, intellectual honesty and dedication to searching for the truth —these are the hallmarks of a good scientist.
12) Erecting hypotheses that can be falsified, and designing experiments capable of doing so, is the hallmark of the true scientist.
13) Humility is the hallmark of any true scientist.

I have selected only those concrete features and abstract values that appear right next to the collocation, i.e., either in the same sentence or another sentence but just before the collocation. For example, if I am analyzing the contexts of "hallmark" as a collocation of "true scientist," and considering 10), then only one abstract value is selected, "humility." In short, the KWIC analysis allows us to extract many of the concrete features and abstract values that competent speakers associate with "good scientist" and "true scientist," simply by investigating the contexts in which these collocations occur.

4. Analysis

As said in the previous section, I will conduct two analyses: a collocation and a KWIC analysis. By combining these two types of analysis, we can construct a comprehensive structure of both the concrete and abstract dimensions of SCIENTIST. In Section 4.1, I will present the results of the collocation analysis for both "good scientist" and "true scientist".[10] Then, in Section 4.2, I will present the results of the KWIC analysis.

4.1. Collocation analysis

For the collocation analysis, I will categorize the collocates into four groups: non-relevant collocates (NR), collocates directly referring to concrete features (CF), collocates directly referring to abstract values (AV), and collocates revealing concrete features and abstract values through their KWIC analysis (KWIC).

Among the top 20 collocates of "good scientist" (see Table 1), there are seven collocates that are not relevant for the analysis. First, "creationist," "atheist" and "incompatible" address the question of whether being a good scientist is compatible with holding a specific religious position. These terms often appear in contexts of uncertainty, and therefore do not assert that a specific religious attitude is a defining feature of scientific practice. Consider the following examples:

14) Can a creationist be good scientist?
15) Did you have to be an atheist to be a good scientist?

Second, "thermodynamics" is used when talking about scientific practice, but not as a required knowledge area for a good scientist, as in:

16) There are gaps in the fossil record, mutations are harmful, or evolution violates the second law of thermodynamics. A good scientist will reject or revise evolutionary theory based on the facts that are presented.

[10] "Good scientist" has an absolute frequency in the corpus of 1,677 occurrences, while "true scientist" has an absolute frequency in the corpus of 890 occurrences.

Third, "Dawkins" and "Hoffman" refer to the famous scientist Richard Dawkins and the scientist and conspiracy theorist Jim Hoffman, respectively. Fourth, "chemist" appears in contexts where the person being discussed happens to be a chemist but where the speaker does not talk of any concrete features or abstract values, as in:

17) He is also a chemist and a good scientist and during one of his experiments his nose evaporates.

Table 1

Top 20 collocates of "good scientist" and "true scientist", with their MI scores and the type of collocate for the analysis

"good scientist"	MI score	Analysis	"true scientist"	MI score	Analysis
skeptic	12.21	AV	Fallacy	14.23	NR
creationist	12.08	NR	spoken	12.77	KWIC
hallmarks	11.67	KWIC	unscientific	12.46	KWIC
disprove	11.62	CF	hallmark	11.21	KWIC
hallmark	10.62	KWIC	humility	10.99	AV
thermodynamics	10.63	NR	fallacy	10.94	NR
communicator	10.49	AV	atheist	10.88	AV
Dawkins	10.35	NR	skeptical	9.92	AV
atheist	10.29	NR	philosopher	9.75	KWIC
scientist	10.17	KWIC	scientist	9.65	KWIC
skeptical	10.17	AV	curiosity	9.45	AV
mathematician	10.18	KWIC	Darwin	9.24	NR
chemist	9.71	NR	researcher	9.08	NR
engineer	9.52	KWIC	discoveries	8.98	CF
incompatible	9.53	NR	Gilbert	8.94	NR
hypothesis	9.50	CF	scholar	8.93	KWIC
philosopher	9.42	KWIC	humble	8.65	AV
qualities	9.23	KWIC	questioning	8.63	AV
like	9.13	KWIC	theories	8.32	KWIC
Hoffman	9.02	NR	knows	8.22	KWIC

Among the collocates directly referring to concrete features, there are two notable examples. First, "disprove" reflects the idea that a good scientist must attempt to disprove her / his own theories. This collocate appears in sentences such as:

18) A good scientist will always try to disprove as well as prove their own theories.

Second, "hypothesis" pertains to a central activity in scientific practice, investigating, holding, testing, or disproving hypothesis. It is used in contexts like:

19) No good scientist holds to any hypothesis despite the evidence.

There are three collocates representing abstract values. On the one hand, "skeptic" and "skeptical" convey the idea that being a good scientist requires adopting a critical attitude towards theories and hypotheses to reach the truth (in this sense, it is similar to "questing for impartial truth"). These terms appear in sentences such as the following:

20) Any good scientist is a skeptic.

21) And a good scientist is always skeptical.

On the other hand, "communicator" suggests that a good scientist must also excel in communication, effectively conveying their research to the layperson. Consider the next example:

22) A good scientist is also a good communicator, who can take the data and explain it clearly to another intelligent and honest seeker of understanding.

Finally, there are eight collocates that reveal the presence of concrete features and abstract values after a KWIC analysis. First, "hallmarks," which appears in constructions such as "one of the hallmarks of a good scientist is ...." Second, "hallmark," as in "The hallmark of a good scientist is ...." Third, "mathematician," found in contexts like "You can't have a good scientist or mathematician without ...." Fourth, "scientist," in sentences such as "And a good scientist is a ... scientist." Fifth, "engineer," as in "You cannot, for instance, be a good scientist or engineer if ...." Sixth, "philosopher," as in "... the philosopher did what a good scientist does, ..." Seventh, "qualities," in phrases like "these are qualities essential for a good scientist." Eighth, "like," as in "like a good scientist, he wanted ...."

In summary, there are seven non-relevant collocates, two that represent concrete features, three that represent abstract values, and eight that, after a KWIC analysis, reveal both concrete features and abstract values.

I will now present the results of the collocation analysis for "true scientist" (see Table 1). Similar to the case of "good scientist," some of the top 20 collocates are not relevant. First, "Fallacy" and "fallacy" refer to the No True Scientist Fallacy, a modern name for Flew's No True Scotsman fallacy. Second, "philosopher" appears in contexts discussing whether someone is both a true scientist and a philosopher, without highlighting any concrete features or abstract values, as in:

23) He is neither a true scientist, nor just a philosopher.

Third, "Darwin" and "Gilbert" refer to the renowned scientists Charles Darwin and William Gilbert, where the speaker simply asserts that they are true scientists. Fourth, "researcher" is used in apposition with "true scientist" and other similar terms such as "truth seeker," which seems to indicate that they are used as mere synonyms.

There is only one collocate indicating concrete features: "discoveries." This suggests that a defining characteristic of a true scientist is the continual pursuit of new discoveries, as in:

24) The true scientist is not a discoverer of this or that; he, or she, embodies a process of ongoing, successive discoveries.

Six different collocations seem to directly indicate the presence of abstract values. First, "questioning" conveys that a hallmark of a true scientist is their continual inquiry, as in 25) and 26):

25) A true scientist never stops questioning.
26) He was a true scientist, always questioning.

I have included this as an abstract value because I consider it to be close, if not similar, to questing for impartial truth. Second, "humility" reflects the notion that a true scientist demonstrates humility in their scientific practice. Examples include:

27) Not all people are able to maintain the humility of a true scientist.
28) He confessed with the humility of a true scientist that he had no explanation.

Third, the use of "atheist" suggests that a true scientist cannot be an atheist, thus indicating the necessity of faith. Unlike in the case of "good scientist,"[11] this term appears in explicit assertions such as:

29) No true scientist could be an atheist.
30) Gruenwald said that no true scientist can be an atheist from a scientific standpoint, it is not possible.

Fourth, "skeptical" refers to the idea that something indispensable to be a true scientist and to reach the truth is to maintain a skeptical attitude, as in:

31) A true scientist is skeptical.
32) I think that a true scientist is always skeptical.

Fifth, "curiosity" highlights that true scientists are driven by curiosity, as in:

33) He has a mind of a true scientist: curiosity.
34) Overall, Sasha is a true scientist with a maddening curiosity that drives his critical analysis and experimentation into new frontiers.

Sixth, "humble" refers to the idea that a true scientist is humble, with examples like:

35) The true scientist remains humble.
36) Of all people in the world, the true scientist is the most humble."[12]

Finally, there are seven collocates that, after a KWIC analysis, indicate concrete features and abstract values related to scientific practice. First, "spoken," as in:

37) As he characteristically told me back then, "we're still in the data-collection stage, no conclusions yet." Spoken like a true scientist.

Second, "unscientific," as in:

38) To Sahelian, however, the failure to present both sides, even when there is only one, is unscientific: "A true scientist takes a fair approach," says Sahelian.

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[11] This result is not a trivial one. When speakers use "atheist" in connection with "good scientist" they do not use it in association with abstract values, but when they use it in connection with "true scientist" they do. This susggests that the use of DCCs varies depending on context; in other words, that DCCs are context-dependent. In this sense, this finding aligns with other theories that have argued that DCCs are context-dependent. For example, Phillips & Plunkett (2023) denies the purported asymmetry between DCCs and single character concepts. Among other things, they defend that context has a significant influence on whether a concept may elicit dual-character linguistic behavior. In a similar vein, Baumgartner (2024) defends the "pragmatic view" on DCCs, according to which we can find cases where DCCs are used in a totally new and context-dependent way, and where these context-dependent uses can be explained appealing to top-down primary pragmatic processes such as "strengthening" and "loosening" (Recanati, 2004) or ad hoc concept or occasion-specific senses (Carston, 2019).

[12] Note that while some collocates, for example, "humility" or "humble," can be clearly categorized, other collocates do not fit neatly into one of the two categories. For example, "questioning" could be considered a concrete feature since it refers to a specific activity. Similarly, "discoveries" might be seen as an abstract value rather than a concrete feature because it implies an ongoing commitment to scientific inquiry and truth. This suggests that, although the descriptive and normative dimensions are independent, there is an inherent relationship between them.

Third, "hallmark," as in constructions such as "... is the hallmark of any true scientist." Fourth, "scientist," as in "... is not a true scientist. The scientist considers ...." Fifth, "scholar," as in "Any true scientist (or legitimate scholar of any sort) would ...." Sixth, "theories," as in "No true scientist objects to having his theories verified." Seventh, "knows," as in "as every true scientist knows ...."

In summary, there are six non-relevant collocates, one that represents concrete features, six that represent abstract values, and seven which, after a KWIC analysis, reveal both concrete features and abstract values.

4.2. KWIC Analysis

Now, I will introduce the KWIC analysis, beginning with the results of "good scientist". Through meticulous examination of the eight chosen collocates, I could distinguish the following concrete features and abstract values:

— "hallmarks": *concrete features*: questioning concepts, using different viewpoints, understanding the data, and taking risks; *abstract values*: intellectual honesty, questing for impartial truth, and open-mindedness.

— "hallmark": *concrete features*: controlling the ego, and analysis of the applicability of the scientific method; *abstract values*: being guided by the evidence (similar to quest for impartial truth), and trusting in one's convictions.

— "mathematician": *concrete features*: acquittance with art, logical thinking, strategic planning, and using the imagination; *abstract values*: open-mindedness.

— "scientist": *concrete features*: making complicated things seem simple, strategic planning, and not being influenced by politics or money; *abstract values*: curiosity (three occurrences), humility (two occurrences), unquenchable desire to know (similar to quest for impartial truth), modesty, and perseverance.

— "engineer": *concrete features*: wide vision (similar to using different viewpoints), knowledge dissemination, writing and presentation skills, understanding the social context of science, analysis of the circumstances of a problem, disproving own theories, and attention to details; *abstract values*: prescient vision, scientific integrity, faith in the discipline, inner compass, and obsession.

— "philosopher": *abstract values*: being guided by the evidence, and open-mindedness

— "qualities": *concrete features*: logical thinking (three occurrences), strategic planning, exchange of ideas with colleagues and rivals, good verbal reasoning, and strong industrial partnerships; *abstract values*: curiosity (four occurrences), open-mindedness (three occurrences), perseverance (two occurrences), intellectual rigor, being even-handed, being innovative, being collaborative, and integrity.

— "like": *concrete features*: gathering data (six occurrences), conducting experiments (three occurrences), formulating hypothesis (two occurrences), testing hypothesis (two occurrences), considering the professional career from several angles (two occurrences), revising hypothesis in light of new evidence (two occurrences) (similar to test hypotheses), analysis of the applicability of the scientific method, providing references and sources, analysis of the circumstances of a problem, multi-disciplinary approach, ensuring that the product works, testing subjects, attention to details, and identifying a problem; *abstract values*: open-mindedness (five occurrences), being guided by the evidence (four occurrences), searching for the truth, making questions, curiosity, and perseverance.

As can be seen, speakers associate with "good scientist" both concrete features and abstract values. To enhance the coherence of the analysis, I have categorized analogous KWIC findings under unified headings (e.g., "be guided by evidence" or "search for the truth" under the label "quest for impartial truth") and I have aggregated the results of the collocation analysis (e.g., "quest for impartial truth" encompasses occurrences of collocations like "hallmarks" but also from collocations like "skeptic" or "skeptical" (see Table 2)).

Table 2

Concrete features and abstract values related to "good scientist"

CF and "good scientist"	AV and "good scientist"
disproving own theories / hypothesis (9 occurrences)	questing for impartial truth (27 occurrences)
gathering data (6 occurrences)	open-mindedness (11 occurrences)
logical thinking (4 occurrences)	curiosity (8 occurrences)
testing hypothesis (4 occurrences)	good comunicator (5 occurrences)
conducting experiments (3 occurrences)	perseverance (4 occurrences)
strategic planning (3 occurrences)	humility / modesty (3 occurrences)
formulating hypothesis (2 occurrences)	integrity (2 occurrences)
considering the professional career from several angles (2 occurrences)	being collaborative
analysis of the applicability of the scientific method (2 occurrences)	trusting in one's convictions
attention to details (2 occurrences)	prescient vision
analysis of the circumstances of a problem (2 occurrences)	faith in the discipline
using different viewpoints (2 occurrences)	inner compass
taking risks (2 occurrences)	obsession
identifying a problem	intellectual rigor
understanding the data	being even-handed
questioning concepts	being innovative
controling the ego	
not being influenced by politics or money	
acquittance with art	
using the imagination	
making complicated things seem simple	
knowledge dissemination	
writing and presentation skills	
providing references and sources	
good verbal reasoning	
understanding the social context of science	
exchanging ideas with colleagues and rivals	
strong industrial partnerships	
multi-disciplinary approach	
ensuring the product works	
testing subjects	

As before, to determine the concrete features and abstract values mentioned in the contexts of the collocates of "true scientist," I conducted a KWIC analysis. Listed below are the concrete features and abstract values related to each of the seven collocates identified in the collocation analysis:

— "spoken": *concrete features*: gathering data, and application of mathematics.

— "unscientific": *concrete features*: conducting experiments, and considering new hypothesis and evidence; *abstract values*: questing for impartial truth.

— "hallmark": *concrete features*: making hypotheses, and conducting experiments; *abstract values*: humility, curiosity, courage, and love of truth (similar to questing for impartial truth).

— "scientist": *concrete features*: gathering data, seeing the hidden links between facts, using knowledge to help the less-fortunate, and not asking how theories are generated in observation-oriented disciplines; *abstract values*: being an apprentice of the divine, being skeptical, and questing for impartial truth.

— "scholar": *abstract values*: feeling challenged (similar to curiosity), sincerity, love of truth, and open-mindedness.

— "theories": *concrete features*: conducting experiments; *abstract values*: being guided by the evidence, being skeptical, and questing for impartial truth.

— "knows": *concrete features*: gathering data (two occurrences), and conducting experiments; *abstract values*: being skeptical (two occurrences), awareness of the limits of scientific knowledge (two occurrences), being guided by the evidence, the sacredness of nature, humility, and not being overly optimistic.

As evident, the exploration reveals both concrete features and abstract values associated with "true scientist," with a noteworthy difference compared to the findings for "good scientist." In this case, there is a prevalence of abstract values. As before, I have clustered analogous findings under unified headings, and I have included the results of the collocation analysis (see Table 3).

Table 3

Concrete features and abstract values related to "true scientist"

CF and "true scientist"	AV and "true scientist"
conducting experiments (4 occurrences)	questing for impartial truth (19 occurrences)
gathering data (4 occurrences)	humility (13 occurrences)
making new discoveries (2 occurrences)	not being an atheist (4 occurrences)
application of mathematics	awareness of the limits of scientific knowledge (2 occurrences)
considering new hypothesis and evidence	curiosity (2 occurrences)
making hypotheses	courage
seeing the hidden links between facts	being an apprentice of the divine
using knowledge to help the less-fortunate	sincerity
not asking how theories are generated in observation-oriented disciplines	open-mindedness
	the sacredness of nature
	not being overly optimistic

After presenting the results of the analyses, the next section will discuss some ideas directly derived from these findings, elucidating their direct relevance to the discussion on DCCs.

5. Discussion

The results of the analyses show four points warranting discussion regarding the internal structure of DCCs. Firstly, the identification of concrete features and abstract values in the literature appears inadequate in capturing the complexity of SCIENTIST. Secondly, the findings seem to support the idea that there are realizations dependencies between the descriptive and the normative dimension of SCIENTIST. Thirdly, contrary to what is agreed, both the descriptive and the normative dimension interact with "good" and "true," which implies that both expressions can be used to make the two types of normative evaluation proper of DCCs. Lastly, there are some terms that could be used as potential markers for investigating the internal structure of other DCCs.

5.1. The internal structure of scientist: A more elaborate picture

Knobe *et al.* (2013) identified concrete features such as "Conducting experiments, Analyzing data, Developing theories, Writing papers" (Knobe *et al.*, 2013, p. 243), all of which are included in the results. Tasks like gathering and understanding data, along with conducting experiments, could encompass the first two features. Similarly, formulating and testing hypothesis could be interpreted as a facet of theory development. Moreover, there are others that have to do with the idea of writing papers, for example, writing and presentation skills, and providing references and sources. However, other concrete features directly related with them appear in the results, for example, logical thinking, strategic planning, attention to details, analysis of the applicability of the scientific method, or analysis of the circumstances of a problem.

Significantly, the analyses reveal additional concrete features unrelated to the previously mentioned activities, representing different activities of scientific engagement. These features can be delineated into three distinct groups. The first group relates to innovation, which would include the following: considering the professional career from several angles, using different viewpoints, taking risks, acquittance with art, using the imagination, and multi-disciplinary approach. The second group revolves around science communication: making complicated things seem simple, knowledge dissemination, and understanding the social context of science. The third group seem to indicate the interrelation between industry and science: strong industrial partnerships, and ensuring that the product works.

Regarding abstract values, the analyses show that SCIENTIST involves more than one abstract value, "the pursuit of scientific knowledge" (Knobe *et al.*, 2013, p. 243) or "the quest for impartial truth" (Del Pinal & Reuter, 2017, p. 479). While these values are prevalent in the analyses, other abstract values also emerge with notable frequency, for example, open-mindedness, curiosity, perseverance, integrity, humility, or modesty.

In short, a scientist is not just someone who pursues scientific knowledge or impartial truth applying the scientific method, i.e., gathering data, and formulating and testing hypothesis through experiments. Rather, a scientist is characterized by a multifaceted behavior. They demonstrate curiosity taking risks and using the imagination. Moreover, they are committed to making their research accessible to lay audiences, disseminating knowledge and making complicated things seem simple. Furthermore, humility and modesty are hallmarks of their character, as they control the ego and use knowledge to help the less-fortunate.

5.2. Realization dependencies between concrete features and abstract values

The second issue I would like to address pertains to the nature of the relationship between the two dimensions of SCIENTIST and, more notably, what insights it offers for a deeper comprehension of the internal structure of DCCs in a broader context. Knobe *et al.* (2013) defends that the relationship between the two dimensions of DCCs is one of realization, i.e., "the [concrete] features associated with dual character concepts can all be seen as ways of realizing the same abstract values." For them, "Conducting experiments, Analyzing data, Developing theories, Writing papers" (Knobe *et al.*, 2013, p. 243) all serve as avenues to realize one abstract value, "the pursuit of scientific knowledge" (Knobe *et al.*, 2013, p. 243). As Reuter (2019, p. 7) observes, for Knobe and colleagues "the descriptive and normative information seems to be coordinated." I think that the results of the present study could be interpreted as corroborating this judgment, because there are a significant degree of coordination between the diverse concrete features and abstract values derived from the two analyses. On the one hand, the study seems to reproduce the same coordination relation between the descriptive and the normative information as described by Knobe *et al.* (2013). On the other hand, the new concrete features and abstract values that this study identifies could be organized in realizations dependencies similar to those pointed out by Knobe *et al.* (2013) (see Table 4).

Table 4

Realization dependencies between concrete features and abstract values

Concrete features	Abstract values
gathering data	
conducting experiments	questing for impartial truth
making / testing hypothesis	
not being influenced by politics or money	honesty / integrity
using knowledge to help the less-fortunate	
controlling the ego	
not being overly optimistic	humility / modesty
awareness of the limits of scientific knowledge	
making complicated things seem simple	
knowledge dissemination	good communicator
writing and presentation skills	
good verbal reasoning	
considering the professional career from several angles	
using of different viewpoints	open-mindedness
multi-disciplinary approach	
using of imagination	
taking risks	curiosity / being innovative
acquittance with art	

As shown in Table 4, six different realization relationships are derivable from the results. In all of them, possessing specific concrete features serves to realize the associated abstract values. For instance, if I make complicated things seem simple, I am concerned with knowledge dissemination, I have good writing and presentation skills and good verbal reasoning, it could be said that I am a good communicator. In short, there appears to be a significant coordination between the various concrete features and abstract values that speakers refer in using "scientist." Given that the study reveals new concrete features and abstract values related to the DCC SCIENTIST, one might argue that there is not a single realization relationship, as Knobe *et al.* (2013) suggest, but rather several. It is important to emphasize that the six different realization relationships proposed in this study represent just one possible way of organizing the vast amount of data obtained in the analysis. Whether this phenomenon is unique to this concept or prevalent across other DCCs warrants empirical investigation. Exploring other DCCs, e.g., ARTIST or SOLDIER, and founding that their internal structures are composed of multiple and distinct concrete features and abstract values, and that there are distinct coordination relations between them, could bring us closer to establishing this as a common trait among all DCCs.

To conclude this second point, it is worth briefly considering the possibility that a single concrete feature may realize different abstract values. Consider, for example, the notion of making new discoveries. Is this activity or concrete feature one that manifests the abstract value of the quest for impartial truth, or does it equally reflect the abstract value of open-mindedness? Depending on the chosen criterion, a given concrete feature will realize one abstract value or another. Further-

more, some results —such as "questioning," which I mentioned earlier— can be classified either as concrete features or as abstract values. All of this supports the earlier point that there are different ways of organizing the data. However, there are limitations on the realization relationships between concrete features and abstract values. For example, gathering data or conducting experiments does not seem to realize the abstract values of curiosity or being a good communicator. Likewise, the use of imagination or familiarity with art does not appear to realize the abstract value of seeking impartial truth.

5.3. The interactions of "good" and "true" with the descriptive and the normative dimensions

The third point that merits discussion has to do with the fact that both search expressions, "good scientist" and "true scientist," are linked both to concrete features and abstract values. Specifically, when searching for "good scientist," the results show nearly an equal number of concrete features and abstract values. As illustrated in Table 2, there are 65 concrete features and 69 abstract values. However, when searching for "true scientist," the results indicate a higher number of abstract values compared to concrete features. As Table 3 shows, there are 16 concrete features and 46 abstract values. This implies that the expression "good scientist" does not predominantly highlight the descriptive dimension over the normative dimension, nor does the expression "true scientist" *exclusively* highlight the normative dimension. I emphasize "exclusively" because there are many cases where speakers straightforwardly associate concrete features with the term "true scientist." Consider the following examples:

39) Erecting hypotheses that can be falsified, and designing experiments capable of doing so, is the hallmark of the true scientist.

40) As he characteristically told me back then, "we're still in the data-collection stage, no conclusions yet." Spoken like a true scientist.

41) Any true scientist (or legitimate scholar of any sort) would consult an advanced scientific text for definitions of technical terms, especially when attempting to criticize them.

42) The true scientist is not a discoverer of this or that; he, or she, embodies a process of ongoing, successive discoveries.

43) Any true scientist tries to rigorously validate the analogy before using it as a component of theory.

In short, speakers use both expressions to indicate that the person they refer to as a scientist possesses certain concrete features or that their behavior conforms to certain abstract values. This finding is significant because the literature suggests that "good" is more directly associated with the descriptive dimension, while "true" is more closely linked to the normative dimension. However, the results of this study suggest that, contrary to what is agreed, both the descriptive and the normative dimension interact with "good" and "true." Note that this does not imply that the two dimensions are not independent. It remains possible to classify someone as a scientist if s/he possesses some of the concrete features but does not strive to achieve any of the abstract values usually associated with the concept. Similarly, it is still possible to classify someone as a scientist when the opposite is the case.

At this point, we can ask ourselves: what is the significance of this finding for other studies on DCCs? I believe this finding is highly impactful, as it is widely assumed that the "true"-modifier highlights the normative dimension of DCCs. However, this study reveals that, while the normative dimension interacts with "true," it also interacts with "good." In fact, the opposite is also true, the descriptive dimension interacts both with "good" and "true." This suggests that, contrary to what is generally accepted, both expressions can be used to convey the two types of normative evaluation characteristic of DCCs. Consequently, these results challenge most existing theories about the "true"-modifier. Further studies will be needed to determine whether this pattern holds for other DCCs. It is possible that this is a unique characteristic of SCIENTIST and that, for instance, speakers do not associate (or rarely associate) concrete features with "true artist," just as they do not associate abstract values with "good artist."

5.4. Potential markers for investigating the internal structure of DCCs

The collocation analysis revealed several terms that, although they do not directly refer to concrete features or abstract values, have proven effective for investigating the internal structure of SCIENTIST when examined in context. These terms are: "hallmarks," "hallmark," "qualities," and "knows." Another reason that makes them suitable for being employed in future studies is their significant frequency. When searching for "good scientist," "knows" appears 46 times, "qualities" 15 times and "hallmark(s)" 11 times. Similarly, when searching for "true scientist," "knows" appears 16 times, and "hallmark" four times. Their high frequency is due to their occurrence in diverse constructions that are commonly used. Consider the following expressions:

— one of the hallmarks of a good scientist

— the hallmark of + a / the / any + good / true + scientist

— qualities + of / for / needed to be / make for + a good scientist

— a / any / every / the + good / true + scientist knows

These four constructions (or variations of them) could be used in future studies to investigate the internal structure of other DCCs. In this way, we could investigate whether the results obtained in the present study are replicated for other DCCs, specifically, whether the expressions "good + DCC" and "true + DCC" both interact with the descriptive and the normative dimensions of DCCs. A search in the enTenTen20 corpus in Sketch engine shows that some of the terms appearing with SCIENTIST also appear with other DCCs.[13] For example, "qualities" is the fourth most statistically significant collocate of "good teacher," the tenth of "good mentor," the 16th of "true friend," and the 41st of "true teacher"; "knows" is the 24th most statistically significant collocate of "true musician," the 30th of "good musician," the 30th of "good minister," and the 48th of "good teacher"; "hallmark"[14] is the 13th most statistically significant collocate of "good mentor," and the 17th of "good theory"; finally, "hallmarks" is the 22nd most statistically significant collocate of "good theory."

To sum up, there are several terms that, in addition to being used frequently, will allow us to extract concrete features and abstract values of DDCs through an analysis of their contexts. Two groups of terms are particularly noteworthy. The first group includes "hallmark(s)," "mark(s)" and "qualities," which refer to the characteristics of a good and true scientist. The second group includes "knows," which relate to what a good and true scientist knows. A thorough investigation of the internal structure of other DCCs will involve a detailed analysis of their most frequent specific collocates, which may, of course, vary from those listed here. However, these terms provide a solid starting point to systematize the search and analysis involved in the complex task of investigating the internal structure of DCCs.

6. Conclusions

The study of DCCs is still in its early stages, as it has been less than a decade since these concepts were first identified. However, research on DCCs is rapidly increasing, both in the number of studies and in the diversity of philosophical areas in which they are applied. In this article, I have explored one of the most under-examined topics in the literature: the internal structure of DCCs.

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[13] The DCCs used in the search were extracted from the Appendix A of Knobe *et al.* (2013).

[14] There are also other collocates directly related to "hallmarks," for example, "mark" is the 41st most statistically significant collocate of "good minister," and "marks" is the 48th most statistically significant collocate of "true musician."

I have focused on SCIENTIST, one of the most representative examples of DCCs. Using corpus methods, I have been able to investigate the two ways speakers use for characterizing their instances. I have searched for the expressions "good scientist" and "true scientist" in the enTenTen20 corpus in Sketch Engine, as these expressions, according to the literature, interact more directly with the descriptive and normative dimension, respectively. The analyses revealed four key findings. Firstly, the internal structure of SCIENTIST is significantly more complex and nuanced than previously reported. Regarding the descriptive dimension, it includes not only typical tasks such as gathering data, conducting experiments, developing theories, and writing scientific articles but also includes concrete features related to innovation and science communication. Concerning the normative dimension, it incorporates the quest for impartial truth, as highlighted in the literature, and other abstract values such as open-mindedness, curiosity, perseverance, integrity, humility, or modesty.

Secondly, the realization relationship between the descriptive and the normative dimension highlighted in Knobe *et al.* (2013) extends beyond the concrete characteristics and the abstract value they mentioned, encompassing other concrete features and abstract values.

Thirdly, the findings challenge most existing theories about the "true"-modifier, as it is widely assumed that the "true"-modifier highlights the normative dimension of DCCs. However, this study reveals that both "good" and "true" interact with both the descriptive and the normative dimension. Searching for the expression "good scientist" yields nearly equal numbers of concrete features and abstract values. In contrast, searching for "true scientist" yields more abstract values than concrete features, but there are numerous instances where "true scientist" is used in connection with concrete features. This suggests that, contrary to common assumptions, both expressions can convey the two types of normative evaluation characteristic of DCCs.

Fourthly, several terms appearing in the analysis, for example, "hallmark(s)," "mark(s)," "qualities," and "knows" could be useful for investigating the internal structure of other DCCs.

To conclude, I want to stress the importance of conducting further studies on the internal structure of DCCs. Without additional research, we cannot fully understand the extent of the findings from this study. For instance, is it plausible to assume that the internal structure of DCCs like ARTIST, SOLDIER or JAZZ is similarly complex or akin to that of SCIENTIST? Until we investigate whether speakers associate concrete features or abstract values when using expressions such as "true artist," "good soldier," or "true jazz," it is challenging to generalize the findings of the present study.

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