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RESEARCH ARTICLE

EPISTEMIC VICES OF DIGITAL GUIDES

DİJİTAL REHBERLERİN EPİSTEMİK KUSURLARI

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Abstract

In this paper, we claim that relying on digital guides such as artificial intelligence or learning machines in justification of knowledge is problematic from the perspective of virtue epistemology. To the latter, the virtues which we are supposed to follow during knowledge acquisition should become habits, so intrinsic elements of character, for the actor of knowledge act without considering the particular results of acts of knowledge. Nevertheless, in comparison with conventional guides, digital guides are taken as more reliable, used more easily and more commonly, and this promotes the actors to develop a habit to violate certain epistemic virtues. To support this claim, first, we looked at the debate around justification problem in the last century and showed that virtue epistemology was offered as a solution to the problem of justification. Then we exemplified conventional guides, which are analytic guides and scientific guides, and digital guides, use of which we aimed to discuss in the context of epistemic virtues. At the end, we discussed why it is problematic from the vantage point of epistemic virtues to draw upon digital guides as we do right now.

Keywords: Artificial Intelligence, Gettier Problem, Virtue Epistemology, Knowledge, Justification

Öz

Bu makalede, bilgiye ulaşmada dijital rehberlerin kullanılmasının, yani gerekçelendirme sürecinde yapay zekâ ya da öğrenebilen makinelerin rehberliklerinin kabul edilmesinin erdem epistemolojisi bakımından sorunlu olduğunu öne sürdük. Buna göre, bilginin temin edilmesinde takip edilmesi gereken erdemler alışkanlığa, bilenin karakterinin içkin bir parçasına dönüşmeli ve tekil bilme eylemlerinin sonuçları bunların önemini azaltmamalıdır. Ancak geleneksel rehberlere kıyasla dijital rehberlerin güvenilirliği daha yüksek, kullanımları daha kolay ve yaygın olduğu için belli epistemik erdemlerin ihlal edilmesinin alışkanlığa dönüşmesini teşvik ettiğini öne sürdük. İddiamızı desteklemek adına ilk olarak XX. yy. epistemolojisindeki gerekçelendirme tartışmalarına değip erdem epistemolojisinin bilginin gerekçelendirilmesi problemine bir yanıt olarak ortaya çıktığını gösterdik. Sonrasında geleneksel rehber türleri olarak niteleyebileceğimiz analitik ve bilimsel rehberlerin ve bizim tartışmak istediğimiz dijital rehberlerin bilginin gerekçelendirilmesi sürecinde nasıl çalıştığını örnekledik. Son olarak dijital rehberlerin erdem epistemolojisi bakımından geleneksel rehberlere kıyasla neden sorun teşkil ettiğini tartıştık.

Anahtar Kelimeler: Yapay Zekâ, Gettier Problemi, Erdem Epistemolojisi, Bilgi, Gerekçelendirme

Definition of Knowledge as Revised in the Last Century

Aristotle begins his *Metaphysics* with the famous maxim: *By nature, all men long to know* (Aristotle 980a). Humans are curious by nature and want to know about and understand what is happening inside and around them. In this regard, epistemology has been trying for centuries to lift the cloud of suspicion over the act of knowing. One of the most important questions in the history of philosophy to explain this act is "What is knowledge?". From Plato to this day, there have been many ideas about analysis and the

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definition of knowledge. The analysis of knowledge is discussed in Plato's *Theaetetus*, to which philosophy refers to discuss the nature of knowledge even today, on the basis of proposition that *to know something one must be justified in believing it* (Plato 201d). Knowledge, to *Theaetetus* definition or simply JTB, is sort of a belief that include three conditions: Being a belief which is supposed to be true and is owned by someone who is also expected to justify that belief. This tripartite definition of knowledge is often expressed briefly as follows: knowledge is justified true belief.[3] Edmund L. Gettier, in his famous article "Is Justified True Belief Knowledge?" analyzes this definition in these three classical steps:

S knows that *p* if and only if

i. *p* is true,
ii. *S* believes that *p*, and
iii. *S* is justified in believing that *p*. (Gettier).

Gettier's main objection is aimed at the third proposition above. Gettier's two cases in his article were constructed to argue that justification requires proof, but the proof is sometimes provided only by chance, thus he claimed that the definition of knowledge comes short when the belief is justified by chance where it is not supposed to be (Gettier 123).

Even though some stayed loyal to the traditional analysis of knowledge as justified true belief in the relation between epistemic justification and luck (de Grefte), Gettier's influence has led philosophers to serious discussions about JTB definition. A way of reformulating the definition of truth by reforming the traditional definition was highlighting the "truth", or "T" in JTB. Alvin I. Goldman with his article titled "A Causal Theory of Knowing" proposed a remarkable solution following this way (Goldman). In the alternative cases in his article, he tried to solve the problem by using the causal requirement to fulfil the justification, and the requirement of correct reconstruction in JTB (Goldman 370). Then he discusses the strong and weak parts of his analysis with examples, and he finally maintains that there is no answer to the truth conditions for "*S* knows that *p*." who is skeptical of his own experience (Goldman 372).

The first proposition becomes more important in Goldman's argument because one can be sure that one knows what it is blatantly. In this case, the question arises: Do we *really* need justification for what we have already known? This situation, which seems like a vicious circle, can lead us to become suspicious of what we know. If we want to get out of this vicious circle, the first proposition must be accepted as true. From this vantage point, realist epistemologists have argued that the relationship between knowledge and truth should be mutually supportive, as offered in the tripartite JTB analysis.

[3] T. Williamson and some epistemologists disagree with this analysis. But he accepts the importance of three main notions, which are truth, justification, and belief (Williamson).

Robert Nozick finds another solution with "sensitivity", and he reformulates the JTB definition in this way:

i. *p* is true,

ii. *S* believes, via method or way of coming to believe *M*, that *p*.

iii. If *p* weren't true and *S* were to use *M* to arrive at a belief whether (or not) *p*, then *S* wouldn't believe, via *M*, that *p*.

iv. If *p* were true and *S* were to use *M* to arrive at a belief whether (or not) *p*, then *S* would believe, via M, that *p* (Nozick 179).

Ernest Sosa modified this case by arguing that belief is safe if and only if it is based on a reliable indication, and he replaced/compared this safety with Nozick and DeRose's sensitivity (Sosa, 'How to Defeat Opposition to Moore' 146). He accepted that his safety argument was like sensitivity in the first approximation of a reliable indication.

Sensitivity and safety, however, are still open objections to the skeptics' arguments. Juan Comesaña's Halloween Party[4] is a counterexample, which argues that knowledge is compatible with beliefs (can be false), whereas there can be unsafe knowledge with certainty (Comesaña 402). But this kind of skeptical objection is not enough for safety theorists such as Tomas Bogardus. He argues that the skeptic's arguments move fallaciously from the fact that *S* was exposed to epistemic risk before forming his belief to the conclusion that *S*'s belief was formed unsafely (Bogardus).

Sensitivity, safety, and similar concepts, including such reliable belief formation processes, may be adequate for knowledge, but they are not required for all kinds of definitions for knowledge. Knowledge may be a complex concept with tripartite aspects, and truth may be a *sine qua non* for achieving knowledge, but not for belief. As the discussions in the field hereafter showed, if one claims otherwise, one is committed to a limited perspective on knowledge. Some claimed that while giving a perfect definition of knowledge to ensure what we claim to know is true is a legitimate way, striving to fulfil epistemic norms is another. In this regard, Ernest Sosa's contribution to the debate, which refers to Aristotle's notion of "apt performance" is critical: "Knowledge is a form of action, to know is to act, and knowledge is hence subject to a normativity distinctive of action, including intentional action." (Sosa, *Epistemology* 207). He claims that knowledge is a sort of action, and if someone *acts* according to definitions and virtues and achieves one's goals with the help of these norms, this is acceptable for true knowledge beyond certainties.

On Sosa's footsteps, Pigluicci provides a shortlist of epistemic virtues and vices (Pigliucci). To him, among the virtues are attentiveness, benevolence (principle of charity), conscientiousness, creativity, curiosity, discernment, honesty, humility,

[4] In this example, the host of the Halloween Party hires Judy to be a guest at the event. Judy is instructed to give all guests the exact directions, which are indeed correct, but when she sees Michael, the party is moved to another location. Because the host does not want Michael to find the party. Given that Michael is not joining the party. If some guest does not, but almost look like Michael- to wearing a costume-. Then Michael's assumption about the party's whereabouts based on Judy's statement will be accurate. But in this example, Judy's statement could easily be wrong (Comesaña 398–399).

objectivity, parsimony, studiousness, understanding, warranty, and wisdom. Vices include close-mindedness, dishonesty, dogmatism, gullibility, naiveté, obtuseness, self-deception, superficiality, and wishful thinking. We will call these virtues and vices in near the end, after we brought the guides into the picture in the next section.

Guide Examples

After this epistemological introduction, we shall explain what we mean by a guide via examples. We suggest that guides have two types – analytically justified and scientifically justified.

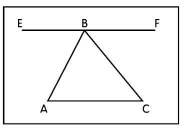
Analytical Justification

Analytical justification refers to the justification of a conclusion via analytically derived laws. The example, inspired by the dialogue with the slave in Plato's *Meno*, is as follows:

> *S* tries to solve a problem that he has never encountered:
> If two interior angles of a triangle are 50º and 60º, what is the interior angle of the third? The knowledge that should be a guide for *S* in solving this simple problem is the triangle sum theorem. In Euclidean space, the sum of angles of a triangle equals 180º.
> *S* knows that *p* "the third interior angle is 70º" if and only if
> i. *p* is true,
> ii. *S* believes **via the guide** (triangle sum theorem) *p*, and
> iii. *S* is *analytically justified* **via the guide** in believing that *p*.
> iv. *S acts* according to *p.* (Act is figuring out a solution to the problem in this simple mathematical equation: 180-50-60=70).

What justifies *S*'s belief in *p* is a geometrical proof[5] of the Triangle Sum Theorem. In other words, *analytically justified* refers to the proof that the sum of the interior angles of a triangle is 180º. A simple mathematical operation shows that the third angle is 70º. It can be, therefore, clearly argued that deductions are not sufficient for the concept of knowledge. However, Lawrence H. Powers has analyzed and criticized this claim in his article titled "Knowledge by Deduction" using the example of *Meno*'s slave. In this paper, he argues that a person who knows given premises and whose belief states are stable during questioning can be made to know any given deductive consequence of those premises by an adequate sequence of questions (Powers 371). Thanks to the Powers,

[5] Triangle *ABC* is equals $\angle A + \angle B + \angle C = 180°$.



Proof: In this given triangle *ABC*, draw a line *EBF* so that line *EBF* is parallel to line *AC*.
1. Angle *CAB* equals angle *ABE*.
2. Angle *ACB* equals angle *CBF*.
3. The sum of the interior angles of the triangle, equals angle *ABE* plus angle *ABC* plus *CBF*. These angles taken together from the straight angle *EBF* (Tabak 13).

the analysis of analytically justified knowledge is set up for the guide example, which demonstrates how the guide example works in principle. All of these analytic guiding examples are all related to the mathematical inductions.[6] This is a general way to prove that some statements about the integer *n* are true for all $n \geq n_0$ (Graham, Knuth, and Patashnik 3).

Scientific Justification

Scientific justification refers to the justification of a conclusion via scientifically derived, drawing on evidence and induction, laws, or law-like propositions.

S, tries to solve a problem that *S* has never encountered before:

If the angle between the plane mirror and the incident ray is 15°, what is the angle of reflection? The guide for *S* in answering this simple question is the law of reflection. The incident ray, the reflected ray, and the normal to the surface of the plane mirror lie in the same plane. In addition, the angle of reflection is equal to the angle of incidence.

S knows that *p* "angle of reflection is 75°" if and only if

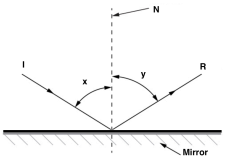
i. *p* is true,
ii. *S* believes **via the guide** (the law of reflection) *p*, and
iii. *S* is *scientifically justified* **via the guide** in believing that *p*.
iv. *S acts* according to *p.* (Act is figuring out a solution to the question thanks to the law of reflection and simple arithmetic: 90-15=75).

What justifies *S*'s belief in *p* is a scientific proof of the law of reflection[7]. In other words, *scientifically justified* refers to the proof that the angle of reflection is equal to the angle of incidence in a plane mirror. Again, a simple arithmetic equation proves why the angle of reflection is 75°. The guide here is not based on deduction and allows us to produce knowledge. In this case, however, one of the most serious criticisms could be raised in the form of a question: "What is it to be a law of nature?". To search for an answer to this question is closely related to the problem of induction and scientific knowledge.

As Hempel pointed out, law-like sentences are statements of universal form, such as 'All robin's eggs are greenish-blue', 'All metals are conductors of electricity', 'At constant pressure, every gas expands with increasing temperature' (Hempel and Oppenheim 153). Nevertheless, David Hume is famous for his search for warrant for such regularities in

[6] Principle of mathematical induction:
If *S*(n) is a statement involving n and if
(*i*) S (1) holds, and
(*ii*) for every k ≥ 1, *S*(k) implies *S*(k+1), then for every ≥ 1, the statement *S*(n) holds.
Deductive reasoning is a key component of mathematics, and one specific kind of deductive reasoning is mathematical induction. Therefore, despite its name, mathematical induction is not a method for thinking that is "inductive" in the philosophical sense; rather, it is one of several methods that can be used to carry out the deductive reasoning that separates mathematics (Fejer and Simovici 177).

[7] The angle between the incident ray (**I**) and the normal (**N**) is equal to the angle between the reflected ray (**R**) and the normal.



The angle between (I) and the plane mirror is 15°, that means (x) is 75°. The angle of reflection (y) which is equal to (x) and it is 75°.

nature and is the most well-known philosopher who addressed the problem of induction in his *A Treatise of Human Nature and An Enquiry Concerning Human Understanding.* The problem of induction challenges our justifications for believing that the future will be similar to the past, or, more generally, expectations derived from previous observations concerning unobserved phenomena. The reasoning from the observed to the unobserved is called "inductive inference" and Hume claimed that there is no noncircular method to defend it even though everyone makes and must make such judgments (Howson 6).

N. Goodman's well-known arguments about induction in "The New Riddle of Induction", in his *Fact, Fiction, and Forecast*, on the other hand, can help us provide an answer. He considers Hume's induction problem as a pseudo-problem and his "grue and bleen" arguments might provide a solution. N. Goodman's argument can be summarized in his own words as follows: "Only a statement that is *lawlike,* regardless of its truth or falsity or its scientific importance, is capable of receiving confirmation from an instance of it; accidental statements are not. Plainly, then, we must look for a way of distinguishing lawlike from accidental statements."(Goodman 73).

This argument has generated serious controversy and some concern even without considering *ceteris paribus*. Among others, even Fred Dretske's ten coin toss[8] argument, which is based on the probability of generalization, is worth considering (Dretske 257). Even considering this kind of limited criticism, I can still argue that laws of nature are universal truths. For the same reason, I choose one of the scientific laws, namely, the law of reflection, that the angle of incidence is equal to the angle of reflection. A scientific theory known as a law of nature explains a natural phenomenon that occurs regularly and reliably under certain circumstances. These theories provide a basis for understanding and predicting the actions of natural systems and are based on repeated and tested observations and experiments over time. Essential truths about how the universe works are known as laws of nature, and they are often used to create scientific hypotheses and models that describe how natural systems behave. The laws of motion, the laws of thermodynamics, and the laws of electromagnetism are some examples of laws of nature that are accepted as true regardless of one's beliefs.

Gettier's example has been slightly modified in terms of doubting knowledge (Kader Düşgün and Çiçek 1277). We have made additions to the traditional knowledge analysis with respect to the two propositions above and have added the following appendices: The bold terms in (ii) and (iii). The italicized expression in proposition (iii) is the contribution of Goldman's causal information theory. The last addition is the relation of knowledge and act in (iv).

Digital Justification

[8] "I flip the coin once. It lands heads. Is this evidence that my hypothesis is correct? I continue flipping the coin and it turns up with nine straight heads. Given the opening assumption that we are dealing with a fair coin, the probability of getting all ten heads (the probability that my hypothesis is true) is now, after examination of 90% of the total population to which the hypothesis applies, exactly 0,5. If we are guided by probability considerations alone, the likelihood of all ten tosses being heads is now, after nine favorable trials, a toss-up. After nine favorable trials it is no more reasonable to believe the hypothesis than its denial. In what sense, then, can we be said to have been accumulating evidence (during the first nine trials) that all would be heads? In what sense have we been confirming the hypothesis?" (Dretske 257).

After two basic guideline examples within the same concept, a digitally justified example (the more important example for our argument) can be shown. This example is based on any digital technology that replaces analytical and scientific justifications. These technologies are usually known as rule-based systems, artificial intelligence, decision tree learning, deep learning, machine learning, artificial neural networks, etc.[9]

S, knows nothing about chess and tries to checkmate the opponent's king in Figure-1. How can *S* checkmate white in a single move?

The knowledge that should guide *S* is the ladder (lawnmower) mate pattern. This means that two pieces push the opponent's king to the end of one side of the board.

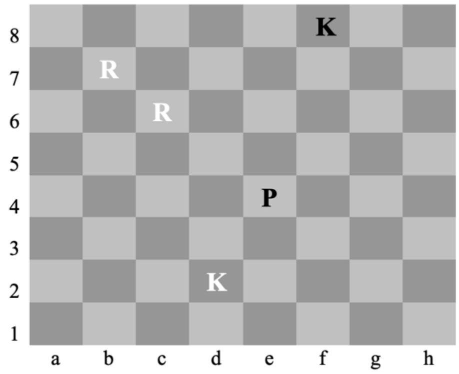


Figure-1: Ladder (Lawnmower) Mate Example

S knows that *p* (moving the Rock on the c6 to c8) IFF

i. *p* is true,
ii. *S* believes **via the guide** *p*, and
iii. *S* is *digitally justified* **via the guide** in believing that *p*.
iv. *S acts according to p.* (Acting means making a move to Rc8).

It is just a simple move for chess players who even know the name of the pattern. If you know the rules of chess, you can easily figure out what the right move is for checkmate. However, *S* has no idea about chess and its rules, but *S* knows the correct move of the digital device that is programmed to play chess. Normally, *S* must have a good understanding of chess strategy, including how to control the center of the board, how to develop his pieces, and how to coordinate his attacks. Without this knowledge, it would be impossible for *S* to set up the ladder mate pattern and checkmate his opponent. But making the right move should be a basic requirement for almost all computer chess algorithms, even for elementary versions. This move should be made at the end of the game and only limited parameters -there is only one possible move- should be considered for checkmate. We know that computer programs can now play chess almost perfectly when compared to humans. The reason we gave this example is that we wanted to show how the control of digital devices works in a digitally justified way at the most basic levels.[10]

[9] For some early examples: (Dietrich 46; Genesereth and Nilsson 177).
[10] Garry Kasparov played six chess matches with Deep Blue in 1996-7. Because of his performance, one argue that he is the first chess cyborg (Hale and Hartmann 56).

Epistemic Vices of Guide Following

Digitally justified examples are not limited to simple chess moves, but also include digital calculators to calculate all mathematical equations, digital watches to keep track of time, and GPS navigation systems to decide routes. From simple digital devices to advanced digital computer systems such as AI, they have all provided information or knowledge. All in all, digital devices are everywhere, and we take their guidance for granted. First question, therefore, is if their guidance is reliable.

This question can be answered in computer science with algorithms and other coding tools, but the accuracy of justifications or inferences made by these devices is limited by the data and algorithms, so they may not be true. But R. Anneborg argues that it is possible for an AI agent to know and possess knowledge (Anneborg). Digital devices do not work perfectly right now, but they may in the future. In this context Gettier problems may be helpful arguments for digitally justifications. They need to be checked, and this weakness may be related to one of the famous problems in mathematics called NP-hardness (nondeterministic polynomial-time hardness). A digital device, The Traveling Salesperson Problem (TSP) solver, learns algorithms to evaluate enormous amounts of data and make predictions or justifications based on that data. This problem is a relevant NP-complete problem and was proved by Cook in 1971 (Cook). Nowadays, Graph Neural Networks can solve TSP in NP-complete problems (for example Prates et al.). The NP-hardness problem may be solved in the future, and digital devices will be able to produce faster and more accurate results. It is possible that NP-hardness will be considered as a sort of *Entscheidungsproblem* (Floyd and Bokulich 60). But I think it is not enough for perfect justification. For now, we can only conduct thought experiments on these kinds of digital devices. For example, if we assume that there is a digital device that is the same as Laplace's Demon[11], can Laplace's Demon machine know true knowledge? In theory, Laplace's Demon can predict all atomic movements in the universe from the present to their past and future states:

> We ought then to regard the present state of the universe as the effect of its past and the cause of the one which is to follow. Given for one instant an intelligence which could comprehend all the forces by which nature is animated and the respective situation of the beings who compose it -an intelligence sufficiently vas to submit these data to analysis- it would embrace in the same formula the movements of the greatest bodies of the universe and those of the lightest atom; for it, nothing would be uncertain and the future, as the past would be present to its eyes (Marquis de Laplace 4).

Laplace's Demon may work in a deterministic world, but nature is not deterministic. Reznikoff has proved that it is impossible to predict his own future memory (Reznikoff). Maybe Maxwell's and Loschmidt's demons can be used for thought experiments in the

[11] Pierre Simon Laplace did not use the term demon in his book, but he used "intelligence".

same way. According to Friedel Weinert, Maxwell's demon is a pure sorting demon, a restorer of order and Loschmidt's demon is an active demon: it can destroy the fibrillated state and reverse the velocities of all particles to a less fibrillated, smoother state. Following Weinert's ideas, we can think that the digital demon machines can accomplish this feat (Weinert 128).

Digital devices, therefore, are guides that are far from perfect epistemic reliability now. Even if the demons above, and even better ones, would come to life in AI form, we would need to find a vantage point if those are *truly* the perfect demons we were looking for. Beyond this desperate debate, however, the fact that digital devices are imperfect systems begets a second question: Why do we believe in them *that* much? Conventional guides, analytic and scientific justification tools, are fallible. History of science is cemetery of laughable "once" scientific truths. Some major ideas in philosophy of science are devoted to tangibility of scientific ideas such as T. Kuhn and K. Popper. Even positivist -so-called "outdated"- historians and philosophers of science G. Sarton, R. Carnap believe that scientific change is change towards better ideas, so science progresses by refuting what is taken as true now.

Furthermore, such an insight towards analytic and scientific guides is in complete accordance with epistemic virtues. There is no way to know that if any scientific idea we now have is eternally true (quite the contrary, they keep being revised), and even the most brilliant ideas can suffer from insufficient evidence. In such conditions, a scientist makes her best to find crumbles of truth by applying *possibly inaccurate* evidence to support *possibly inaccurate* ideas (waiting for to be refuted or revised). Then, where is knowledge? The most rational and the easiest way to answer this question is taking knowledge as an act and expecting virtuous behavior from the agent. Now we can see how relevant Sosa's virtues and Nozick's sensibility are when we try to keep analytic and scientific guides reliable while admitting that they are and must be fragile.

When it comes to digital guides, nevertheless, we are prone to violate epistemic virtues quite easily. From googling what we need to know about our next dinner recipe to finding our route to the party house to online calculators for PhD students in mathematics, we are prone to lose the virtues of curiosity, discernment, studiousness, and understanding by finding anything we want under the protection of another epistemic agent, which we also hand over the honesty and objectivity. This might be objected by reminding that how AI make our lives easier by helping the lost one at night in the streets of an unknown city, by recognizing the rare illnesses accurately, or by offering our next favorite YouTube channel based on our watch history. Yet, as Aristotle and his followers such as Sosa and Pigliucci argued, virtues build one's character – they are about who we are, not what we have at the end. Though pragmatic benefit of digital guides is justified, we have to try to find a way to keep this without sacrificing our virtues related to knowing.

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