Uncertainty

English

1. Futures definition

Uncertainty is an inherent and unavoidable characteristic of complex, anticipatory systems that are regularly considered in the futures field. In uncertain contexts, future developments cannot be fully known, predicted, or controlled. In general use, uncertainty is often seen as an unpleasant state, but it is a necessary condition for emergence, novelty, and innovation. Navigating or even embracing uncertainty requires special competences and methodologies.

2. General definitions

In general, uncertainty refers to “situations involving imperfect or unknown information” (Wikipedia English, n.d.-b). In such situations, describing the existing state or a future outcome exactly is impossible. Outcomes are not fixed or pre-determined.

In situations of uncertainty, several qualities are lacking in a system: Uncertainty is “a present state of not knowing, a future oriented inability to confidently predict what will happen in the future and a potential lack of clarity of how to make sense of past events. Given the associated lack of clarity, control, and determinateness, uncertainty tends to be viewed as an unpleasant state that should be quickly resolved” (Beghetto, 2022, p. 1691). On the positive side, “uncertainty is a gateway to the possible.”

In economics, Knightian uncertainty is “a lack of any quantifiable knowledge about some possible occurrence, as opposed to the presence of quantifiable *risk*” (Wikipedia English, n.d.-a).

3. Etymology

In Latin, *incertus* means “not fixed or predetermined; cannot be known beforehand, unpredictable, not specified or decided, unsure, unsafe, doubtful” (Oxford Latin Dictionary, n.d.).

The adjective *uncertain* is the opposite of the more positively connotated c*ertain,* which comes from Middle English *certeyn, certayne*, which in turn is borrowed from Anglo-French *certein, certain,* and goes back to

Latin *certus, which* means *certain*, *fixed*, *settled*, *indisputable*. The Latin noun is *certitūdō,* meaning *certainty* or *certitude* (Merriam-Webster, n.d.-a).

The Latin verb *cernere* means to sift, discern, decide, or determine. The link to the English *decide* is particularly interesting in the futures context, because understanding where and how decisions can be made is important.

The German word for uncertainty is *Unsicherheit*, which links to *security* and is based on the Latin *securus*, meaning freedom from (*se-* (without) + *cura* (care)), or to be safe and secure (Merriam-Webster, n.d.-b). Security, therefore, links to being free from anxiety, fear, or doubt; to be unafraid. This interpretation of security is consistent with the German word *Unsicherheit* also being used to describe an individual's feeling of insecurity.

Another German word for uncertainty is *Ungewissheit,* which is linked to the absence of complete *Wissen* or *knowledge*, and therefore to the English word *unknowable*.

4. Field of terms

Synonyms for uncertainty are *unknowable, unpredictable*, or *unclear.* Somewhat further away are the terms *uncomfortable*, *doubtful*, or *questionable*. The latter word links nicely to the Futures Literacy practice of asking new questions. In relational biology, the term *impredicative* (*prae-dicare*, to proclaim before) is used to refer to a system that cannot be completely described and that is complex (Louie, 2019).

Uncertainty is different from *risk,* and the two should not be confused. Risk has two possible definitions. First, risk refers to a situation with different possible outcomes where *probabilities* can be computed for those outcomes. An example of this first definition is the rolling of dice in Knightian uncertainty. The second definition of risk refers to the possibility of a negative, harmful outcome as opposed to a positively connotated opportunity.

Uncertainty is also different from a*mbiguity* (ambi=two)*,* where something is not clearly defined, and can therefore be interpreted in different ways.

Ignorance is linked to not knowing, as well. However, ignorance may primarily refer to an attitude of not wanting to know, while uncertainty means that full knowledge is impossible.

The antonym of uncertainty is c*ertainty or certain*, as described in the etymology: to be *fixed*, *settled*, (pre) *determined*, as in a fact or truth unquestionably established and clear.

Uncertainty links to c*omplexity* since uncertainty is an inherent feature of complex adaptive, emergent, and evolving systems. Uncertainty, therefore, also links to *emergence* because there cannot be emergence without uncertainty. Since the Enlightenment, uncertainty also links to individual *responsibility* because human actions can influence the future to some degree.

5. Theoretical foundations

According to the *theory of anticipation*, a clear link exists between complexity, impredicativity, uncertainty, and not fully knowing, even if uncertainty is not a central term in the work of Robert Rosen, Aloisius Louie, or Mihai Nadin: “Rosen’s theory of anticipatory systems is a qualitative theory, i.e., … the predictions that the models make do not provide any (quantitative) “certainty” about the future, not even probabilistically” (Lennox, 2024, p. 139). In the words of Poli (2019, p. 12), “complexity (…) shows that uncertainty is unavoidable and the command and control attitude is a no go.”

Also in *complexity theory*, the uncertainty matrices of Dave Snowden use ‘known, knowable, unknowable’ on the ontological axis and ‘known, unknown, unimaginable’ on the epistemological axis to describe what should be done in each combination (Snowden, 2024b). In the *Handbook of Futures Studies*, Snowden concludes that “we have to find a way of navigating what is inherently uncertain to not only minimize risk but also to take opportunities as they arise” (Snowden, 2024a, p. 63), where risk is interpreted as a negative outcome.

Meanwhile, well-known complexity theorists such as Stuart Kauffman (1995), Manuel DeLanda (2007), or Robert E. Ulanowicz (2009) do not use the terms certainty or uncertainty prominently. Ulanowicz (2009, p. 138) mentions "radical uncertainty" but only in quoting Ilya Prigogine to describe the inherent unpredictability and complexity of social systems.

Neuroscience research indicates that the “brain is a pattern-recognition machine that is constantly trying to predict the near future … The brain likes to know the pattern occurring moment to moment, it craves certainty, so that prediction is possible … Even a small amount of uncertainty generates an ‘error’ response in the orbital frontal cortex …” (Rock, 2008, p. 4). The resulting recommendation from neuroscience is that people should try to reduce uncertainty. This reduction in uncertainty is not what futures activities are about, though, which explains why participants often find futures-related interventions challenging.

Furthermore, there are parallels between *music* and futures interventions, as they both work with simple and complex elements. “A prominent driver of musical pleasure responses is the violation and confirmation of temporal predictions. Groove is higher for moderately complex rhythms compared to simple and complex rhythms. This inverted U-shaped relation between PLUMM [Pleasurable Urge to Move to Music] and rhythmic complexity is thought to result from a balance between predictability and uncertainty” (Matthews et al., 2023, p. 1).

In *pedagogy* with a focus on design, a key feature of education “involves confronting a threshold of design uncertainty. In approaching this threshold, they [students] are entering a liminal space which is typical in creative disciplines” (Osmond, J., & Tovey, M., 2015).

Uncertainty is also a central element in *sociology* with Zygmunt Bauman’s concept of “liquid modernity," characterized by constant change, instability, and the erosion of traditional structures (Bauman, 2007). The fluid and ever-changing nature of contemporary society creates a pervasive sense of uncertainty. Bauman contrasts this with "solid" modernity, which was marked by structure, predictability, and enduring institutions.

6. Use in practice

Futures Literacy is the competence to know when to deal with the future in which way and to be able to do this with the appropriate attitude. Complexity is the starting point for the design of futures interventions, for example, for working with alternative futures. Given the link between uncertainty and negative feelings such as anxiety and discomfort, especially for participants with a high need for closure, this risk of discomfort should be made transparent to the host and the participants, clearly explaining the benefits of the exercises and interventions. The negative relationship between uncertainty and security or safety indicates the importance of acknowledging those elements and needs in designing, for example, ‘safe spaces’ for experimenting with uncertainty. Certainty and clarity, in other words, cannot be produced in futures interventions. Uncertainty can only be acknowledged, accepted, tolerated, embraced, or cherished.

The foreword to *Transforming the Future* (Miller, 2018, p. xxi) emphasizes that futures work is about “exploring how humanity can live better with the uncertainty and creativity of a complex evolving universe.” In a later chapter, Miller adds that “complexity thinking provides permission to embrace uncertainty, to be open to complex emergence, at all points in time, even right now” (Miller, 2018, p. 103) and that “cultivating FL is one way of turning the uncertainty inherent in our complex emerging universe from a threat into an asset, from a disruptive force into a source of meaning” (Miller, 2018, p. 108). Based on their futures practice, Cagnin and Garrido in Miller (Miller, 2018, p. 109) invite readers to “embrace complexity and treat uncertainty as a resource for the exploration of new possibilities.”

Every person’s “complexity and uncertainty competence” (Bergheim, 2024) can be increased with futures interventions, first by supporting participants’ understanding that complexity and uncertainty are inherent features of life, and then by practicing how to deal with them.

Terminologist: Stefan Bergheim

This English text is the original entry for this term. No LLM model has been used in the generation of this entry.

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