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Wüster Revisited: On Causal Concept Relationships and Causal Concept Systems

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The purpose of this paper is to discuss causal concept relations and concept systems from the point of view of terminological analysis. As a starting point I take Wüster's classifications of concept relations and systems and I shall try to expand Wüster's classifications.

In my research work I am developing methods and tools for systematic terminological analysis and the most central point is the role of the concept systems and relations as analysing and ordering devices. For my forthcoming dissertation I have studied several types of relationships and concept systems but here I shall concentrate only on causal relations and the corresponding concept relations as well as the structure of the concept systems based on them.

For this paper I have taken examples from a couple of encyclopaedia articles, especially about the geological phenomena of *weathering* (see 1.) and about *plant diseases* (see 2.). Earlier I have studied, such phenomena as *corrosion, allergy, pneumonia* among other things. Diseases and natural phenomena seem to be suitable subjects for causality studies, because by their nature they involve elements of cause and effect.

1. Wüster's classification of concept relations

Causality has been considered as one of the most important principles for ordering our thoughts and concepts. It has been discussed throughout the centuries by philosophers such as Aristotle, Hume and Russell, among others. In the Theory of Terminology causal relationships are mentioned, but not analysed further.

I wanted to describe Wüster's view on causality here but, although he mentioned causality a couple of times he did not develop it further. In one of his articles, he says that he favoured the distinction made by Hume between causal and temporal relations (Wüster 1974b). Wüster classified concept relationships and also concept systems as seen in Figure 1. He mentions two concepts of relationship including a causal component: a broader one called *'Wirkbeziehung'* (see section 3.) (relationship of effect) and a narrower one called *'Kausalität'* (causality) (see section 4.). Wüster thus makes a distinction between pure causal relationships and other relations containing causal elements. What I am most interested in here, is what Wüster calls 'Kausalität' (see Fig. 1) and what I here call 'causal concept relation'. Unfortunately, Wüster did not say much about this kind of relation or the corresponding concept systems. The lack of terminological theory in this case has made causality an interesting research topic.

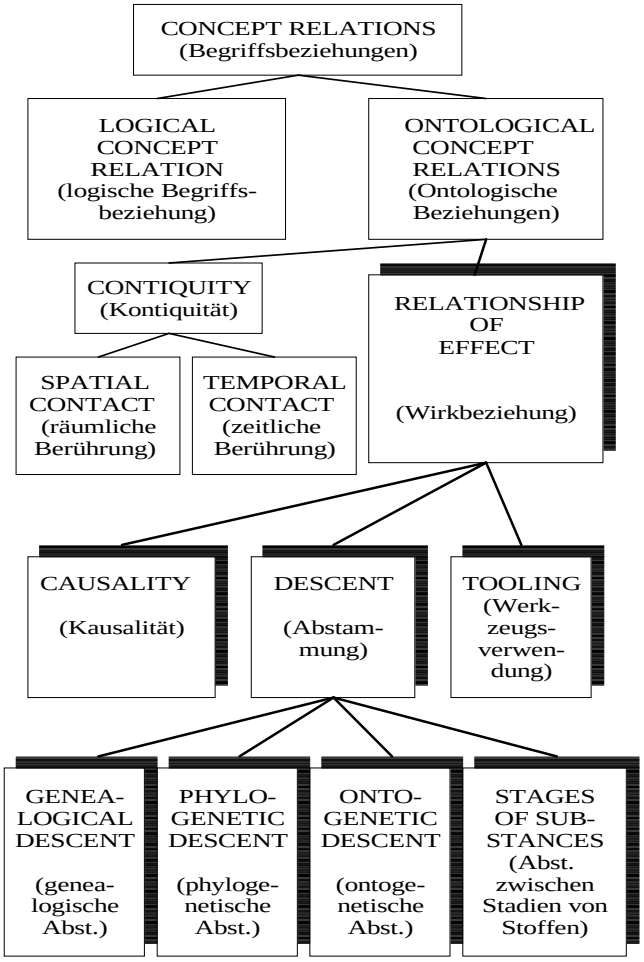


Fig. 1.

2. Vertical and horizontal relations

Wüster (1974: 261ff.) mentions causal concept relations at least in a classification where he divides concept relations further into vertical, horizontal, diagonal and overlapping relations (see Fig. 2).

relations	vertical	horizontal
logical concept relation	super-/subordination (flower - rose)	co-ordination (rose - tulip)
partitive	super-/subordination (book - cover)	co-ordination (cover - page)
temporal	predecessor -> successor	coexistence
causal	cause -> effect	-
tooling	tool -> tooling	-
descent	(pro-consul->austral anthropus) etc.	(gibbon - gorilla) etc.

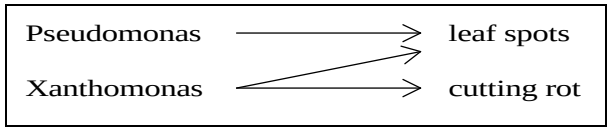
Fig. 2.

This division is based on the direction of relationships inside a concept system. Vertical relations according to Wüster are, for instance, logical sub- and super-ordination as well as partitive sub- and super-ordination. Horizontal relations are for instance logical and partitive co-ordination. The use of the terms 'vertical' and 'horizontal' could also be discussed, but this is a subject for another paper. I am here interested only in the concepts themselves - not their designations.

When we go further into Wüster's classification, we notice that there is only a vertical causal relation, but no horizontal relation at this point. The vertical relation is, according to Wüster, the concept relation based on the connection between **cause** and **effect**. In temporal relations, however, he distinguishes between a vertical and a horizontal relation, i.e. relation of co-existence. As to descent, here Wüster gives examples of vertical genealogical relationship (*Geschwisterteil*), or different animal species that have the same origin (*gibbon, orang-outang, gorilla*).

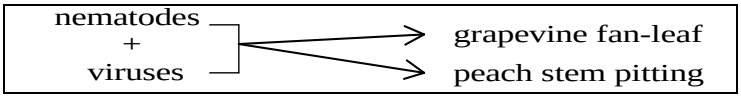
If we return to causal relations, the basic relation exists without any doubt between the concepts of *cause* and *effect*, but in addition to it, I would like to make a distinction between at least four horizontal causal relations and a few others. First of all, there can be a single cause for several different effects or several different causes for a single effect. The same cause can lead to different types of diseases, for instance the bacterium called *'Agrobacterium'* can cause plant diseases called *'crown gall'*, *'twig gall'*, *'cane call'* or *'hairy root'*. Furthermore, there can be different causes for the same disease, for instance, both bacteria *Pseudomonas* and *Xanthomonas* can cause *leaf spots* (see Fig. 3 and appendix 1).

Fig. 3.



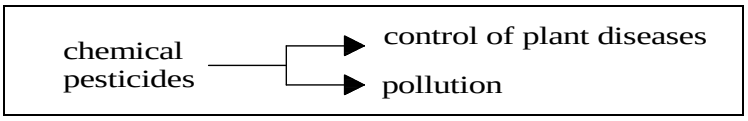
Secondly, there are causes that do not appear alone but need the assistance of some other factor. In this case we could talk about co-operating causes. For instance, contact with a *virus* is not always enough to cause a certain *plant disease*, but the bite of an *insect* or some other vector is needed in order to transmit the disease to the plant (see Fig. 4). So, generally speaking, we could say that both the *virus* and the *insect* are causes of the disease, but their co-operation is needed.

Fig. 4.



Further there are effects that occur together, e.g. the *desired effect* and a *side effect* of a pesticide or medicine (see Fig. 5). When we think of plant diseases, the desired effect is preventing or diminishing the effect, but in some cases the pesticide also causes *harm*.

Fig. 5.



In addition to these four horizontal causal relations and the basic relation between cause and effect there are also relations between effect and consequences or between cause and consequence (see Fig. 6).

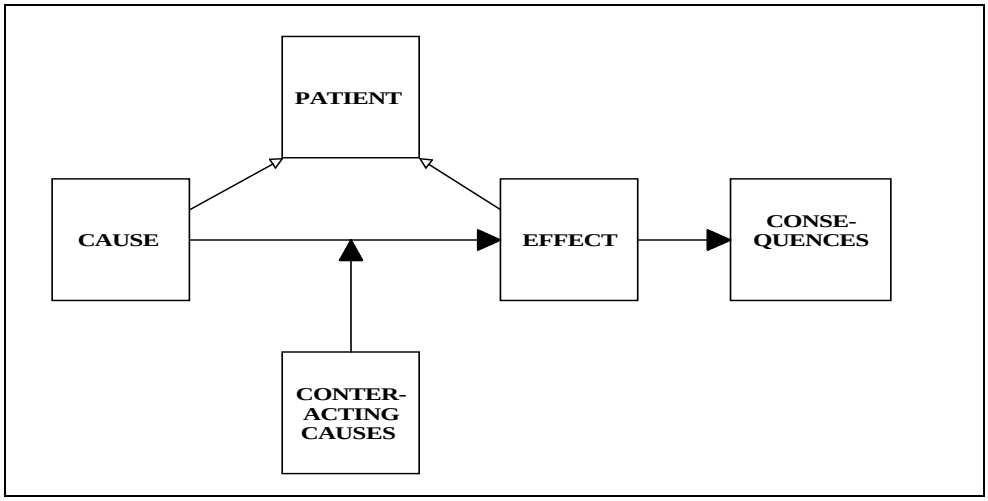
Fig. 6

Causal concept relations are thus able to build concept systems and in these systems we can find relations that are to a certain degree analogous to the relationships of co-ordination in logical and partitive concept systems.

3. The complicity of causality

In order to analyse a causal concept system it is necessary to look at the different types of concepts involved. In a logical concept system the concepts to be considered are either broader or narrower or on the same level of abstraction, but here we have more categories. For this purpose I am using the model in Figure 7 which contains the components that I consider to be the most basic ones.

Fig. 7



The most essential components are of course the concepts of **cause** and **effect**. In addition there are other components, as for instance a concept referring to **patient**, i.e. the object of the

influence, and concepts referring to **counteracting** causes, which could for instance be *medicine* or *vaccination* in the case of a disease (animal). A disease can also lead to some complications, which here are treated as **consequences**. The symptoms of a disease are treated as parts of the effect. In Figure 8 this model has been applied to the plant disease concept.

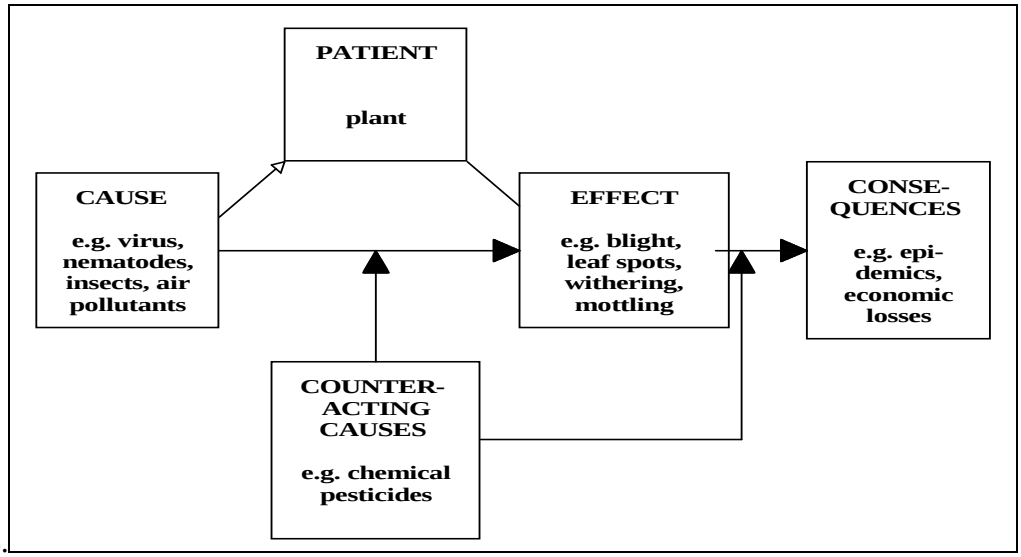


Fig. 8.

These models are extremely simplified, and if we look at one of these systems closer we soon find that cause and effect as well as the other components are sometimes very complicated. As an example I have taken *cause*. There are at least three different kinds of causes: 1) **Causative agent** 2) **Explanatory cause** 3) **Producing cause**. These types of causes are exemplified in Figure 9, where the causes for the weathering of rock and other geological materials are given.

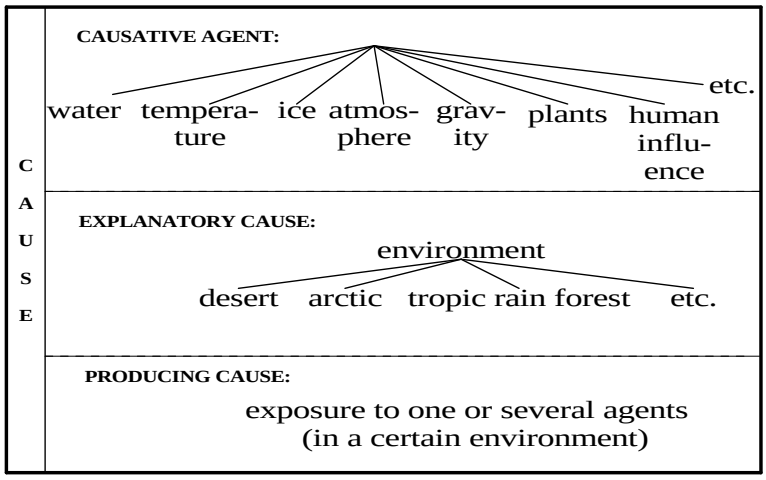


Fig. 9 .

Causative agent includes substances, man or other agents responsible for causing the effect. Explanatory cause comprises additional circumstances and conditions that in addition to the

causative agent made the causation possible. Producing cause is the event, process or activity needed to cause the effect. As to the concept of *effect*, it also involves different aspects, as seen in Figure 10.

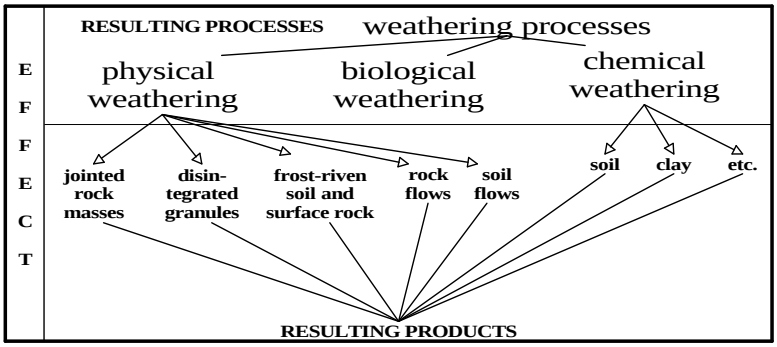


Fig. 10.

In Figure 10 there are two components of effect: **resulting process** and **resulting product**. Resulting process, event or act can be e.g. *weathering, land slide, explosion*) and resulting product e.g. soil, clay etc. (in some other cases: *corrosion -> rust, wearing small shoes -> blister*). In addition to these two we need in some cases to distinguish **resulting state** (e.g. *virus -> disease*; *vaccination -> immunity*).

In the same way as cause and effect, the other components of a causal system each vary in their complexity. These will be described elsewhere.

4. Conclusions

In this paper I wanted to show that causality is more than the basic relation between **cause** and **effect** as Wüster presented it in his classification (see Fig. 11). Causality is a complex phenomenon and finding the causal connections of the subject field and of adjacent subject fields helps us to analyse and organize the concepts and terminology of the field.

causal concept relations		
vertical	horizontal	others
cause -> effect	cause - cause - alternative - co-operative	cause - patient patient - effect
effect -> consequence cause -> consequence	effect - effect - alternative - co-occurring	counteracting cause - cause counteracting cause - effect etc.

Fig. 11.

Causal concept systems seem to be useful tools when the subject field is multidisciplinary, such as plant pathology, the study of plant diseases merging concepts from different fields (e.g. bacteriology, mycology, nematology, virology, genetics, cytology, metereology). The phenomena that are classified here as co-operating or alternative causes for a disease often come from different subject fields (such as air pollution and virology) and the corresponding concepts from different logical concept systems. We cannot possibly take all these concept systems into account if we are studying e.g. one type of plant disease. The concepts that are relevant are thus removed from their so called "natural" concept systems and placed together with some other similar concepts. The relationships between these types of concepts could be called 'pragmatic relations' (see e.g. Arntz & Picht 1989: 81), but I prefer to treat them as concepts connected on the basis of causality.

Notes

1. McGraw-Hill 19/1992: 419-421.
2. McGraw-Hill 13/1992: 676-694.
3. Also: *ursächliche Beziehung/Zusammenhang* (causal relationship/connection).
4. See e.g. Wüster (1974a: 256-263); DIN 2330-1979; Felber (1984: 129), and Wüster (1974b: 61-106); Wüster (1979/85).

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Appendix 1