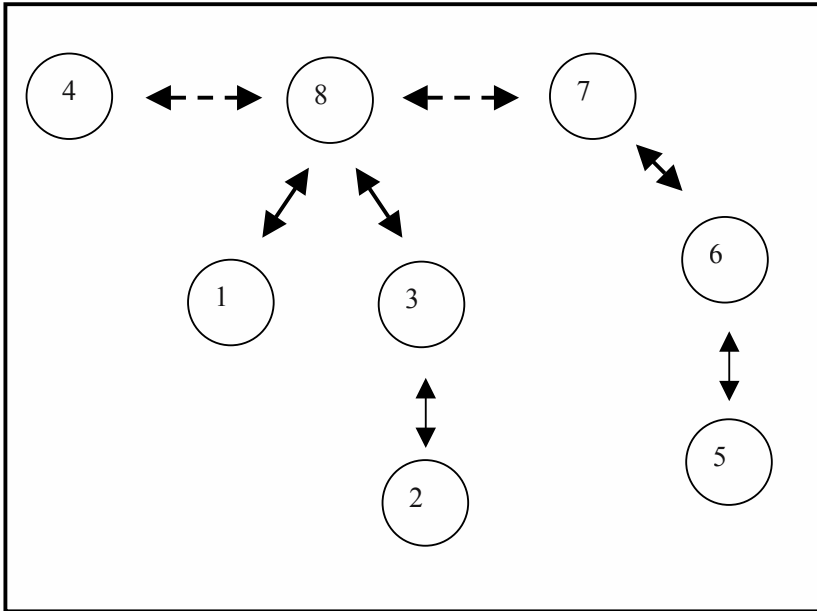5. Lady Maureen was jealous with regard to the Lord.
6. Lady Maureen butler had a motive to murder Lord Hard.
7. Lady Maureen murdered Lord Hard with a knife.
8. The butler murdered Lord Hard with a knife.

The circles in this picture represent the possible beliefs in a theory about the murder case. The double-headed arrows represent constraints between these beliefs. Arrows with a closed line represent positive constraints; arrows with a dotted line represent negative constraints. Initially the beliefs 1, 2, 4 and 5 have a positive status. By repeatedly increasing the status of the beliefs that are positively connected to another belief with a positive status, or negatively connected to a belief with a negative status and decreasing the status of the other beliefs, in the end an equilibrium results.[30] This equilibrium divides the beliefs into two categories, beliefs with a positive status, which are accepted and beliefs with a negative status, which are rejected. The resulting theory is coherent, because the beliefs and disbeliefs mutually support each other.

This theory of coherence as constraints satisfaction has several advantages. First it leaves the nature of the elements in a coherent set open.

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[30] I am implicitly applying the connectionist treatment of the network of beliefs, that Thagard applies in his publications. More on this approach can be found in Rumelhart and McClelland 1986, or in modern introductions to artificial intelligence or cognitive science.

This makes it possible for the theory to deal with elements that have no truth value, such as rules, principles and values and even concepts and parts of images. For application in the law, it is crucial that a coherence theory can deal with elements that are not bearers of truth values.

Second the theory gives a precise specification of what counts as support. Support is a positive constraint and negative support is a negative constraint. This would still be rather vague, were there not the third advantage of coherence as constraint satisfaction, namely that it can be interpreted in terms of neural nets (connectionism) and that there are algorithms available for computing coherence.

Coherence as constraint satisfaction is a promising version of a coherence theory. Nevertheless I think that the theory in the version presented above should be rejected as a theory of legal coherence, if only because an acceptable coherence theory should treat the support relations between the elements as elements of the theory.

Let me return to Lord Hard's case to illustrate what I mean and consider the relation between the belief that the butler was seen entering Lord Hard's room and the belief that the butler murdered Lord Hard. At first sight there is a positive constraint between these two beliefs. But what to think of the case in which one also believes that Harriet saw Lord Hard alive and well after her father, the butler, left his room? If Harriet saw Lord Hard after her father left the Lord's room, the link between the belief that the butler was seen entering Lord Hard's room and the belief that the butler murdered Lord Hard loses its force. So the presence of this link is negatively connected to the belief that Harriet saw Lord Hard alive after her father left his room. This connection between the belief that Harriet saw the Lord and the constraint between the beliefs about the butler entering the room and murdering the Lord, should be part of the theory.

More theoretically this means that one would like positive and negative constraints to be treated as elements of the theory. Moreover, it should be possible to have positive and negative constraints, not only between beliefs mutually, but also between beliefs and constraints. This is illustrated by the following figure in which constraints are depicted as boxes on lines. It shows how there can be a constraint between a belief and a constraint:
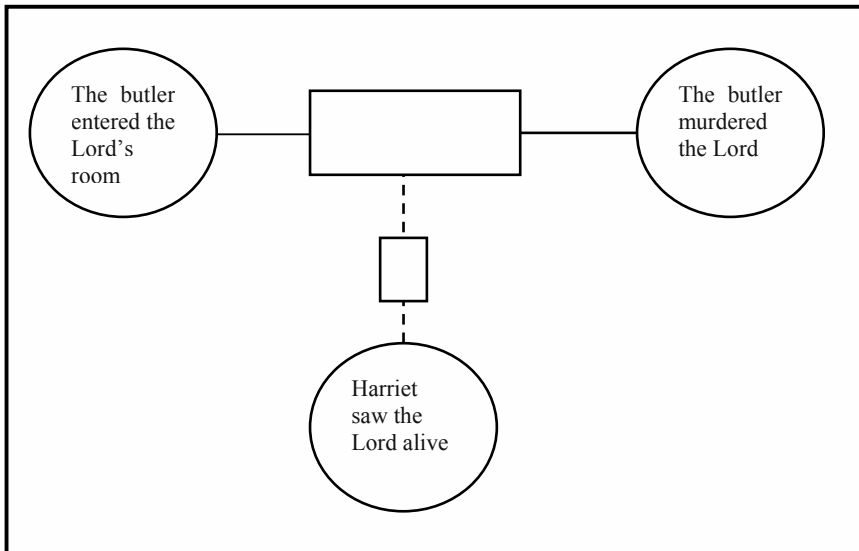
4.   A CASE STUDY

Before proposing an alternative for Thagard's theory of coherence as constraint satisfaction, I want to pay some more attention to the example of the murder upon Lord Hard. One of the things I want to illustrate is how the pursuit of coherence almost automatically leads to making the theory more and more comprehensive. That is why I will start with a very small theory:

   Theory 1
   1.   The butler had a motive to murder Lord Hard.
   2.   The butler was seen entering Lord Hard's room.
   3.   The butler murdered Lord Hard.

Let us assume that neither one of these sentences is above doubt. For instance, the person who was seen entering Lord Hard's room might have been somebody else. It is understandable that the butler had a motive (revenge for the seduction of his daughter by Lord Hard), but the butler might have been unmoved by such all too human passions. And finally, it is not certain that the butler murdered Lord Hard, although it is made probable by the evidence. Although none of the sentences is above doubt, they mutually support each other and together they seem to form a coherent theory.

4.1 Contributive reasons

The question that must be answered now is what the nature of this support is, since it is not deductive support. The support offered by deductively valid arguments is that the conclusion of such arguments must be true if the premises are true. A weaker notion of support is that of a contributive reason for (believing) a conclusion.[31] The presence of such a reason makes the conclusion more believable than it was without the reason. There is, however, no guarantee that the conclusion is true if a contributive reason for this conclusion obtains. A contributive reason may in itself be strong enough to justify belief in the conclusion if there are no counter reasons present, but this needs not be the case. For instance, the mere fact that the butler had a motive for murdering Lord Hard is not sufficient to believe that he actually committed the murder. The same counts for the contributive reason that the butler was seen entering Lord Hard's room. Let us assume, however, that, taken together, these two contributive reasons justify the conclusion that the butler murdered Lord Hard.
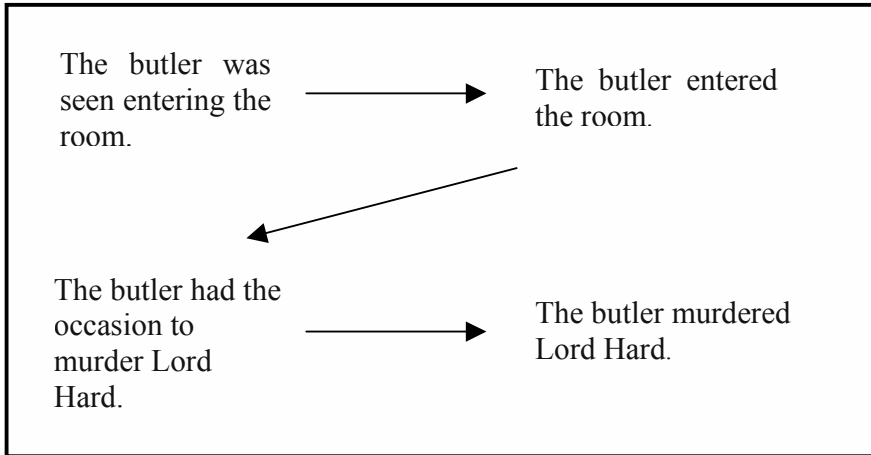
The presence of contributive reasons, no matter how many, does not guarantee the truth of the conclusion for which they plead. It does not even guarantee that the belief in the conclusion is justified, because whether such a belief would be justified does not only depend on the reasons pleading for the conclusion, but also on the reasons pleading against it. Suppose, for instance, that Lord Hard would have died soon anyway and that the butler would have inherited a pretty amount of money from the Lord, an inheritance which he would loose if it were discovered that he committed the murder. This would be a contributive reason against the conclusion that the butler murdered Lord Hard. There may be even more contributive reasons against this conclusion, for instance that the Lord was murdered by means of a knife and that the butler had a phobia for knives. Whether a conclusion is justified on the basis of contributive reasons depends on the balance of the contributive reasons for this conclusion and the contributive reasons against it.[32]

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[31] Here I assume that the reasons are all reasons for believing a conclusion. The distinctions between reasons for belief, reasons for acting and constitutive reasons is discussed in Hage 1997 (RwR), 59f.

[32] There are even more complications because some facts make that other facts that would normally be reasons for or against a conclusion lose their reason giving force, or change the relative weight of reasons. I will ignore these logical details here.

4.2   **Missing links**

Given the notions of contributive reasons for and against a conclusion, the second example can be given a more thorough analysis. The fact that the butler had a motive to murder Lord Hard is a contributive reason for the conclusion that he committed the murder.

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┌──────────────────────────────────────────────────────────────┐
│                                                                │
│   The butler was                    The butler entered         │
│   seen entering the   ────────▶     the room.                  │
│   room.                                                        │
│                                                                │
│                                                                │
│                                                                │
│   The butler had the                The butler murdered        │
│   occasion to         ────────▶     Lord Hard.                 │
│   murder Lord                                                  │
│   Hard.                                                        │
│                                                                │
└──────────────────────────────────────────────────────────────┘
```

The same holds for the relation between the fact that the butler was seen entering Lord Hard's room and the conclusion that the butler murdered the Lord, but there are some complications here. The mere fact that the butler was *seen* entering Lord Hard's room is hardly a reason why the butler murdered Lord Hard. It is, however, a reason to believe that the butler in fact entered the room. And this fact is in turn a reason to believe that the butler had the occasion to murder the Lord. It is this last fact that is the immediate reason to believe that the butler murdered Lord Hard.[33]

   If we compare this chain with the small theory of our example, we find that the second and third link of the chain are missing in the theory. Suppose that somebody believes the theory, but suspends belief in the second and the third link of the chain, or - even worse – believes their negations. Would we then still say that the theory is coherent? The support relation between the second and the third sentence of the theory is lost and with it the coherence of the theory. The lesson to draw is that theory 1 as such is not very

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[33] There are other ways to construct a chain of reasons leading to the conclusion that the butler murdered Lord Hard. The crucial point here is not *which* chain of reasons is made, but rather *that* a chain is made.

coherent, but that it is part of a larger and more coherent theory that includes the second and the third link of the chain:

Theory 2
1.   The butler had a motive to murder Lord Hard.
2a. The butler was seen entering Lord Hard's room.
2b. The butler entered the room.
2c. The butler had the occasion to murder Lord Hard.
3.   The butler murdered Lord Hard.

4.3   Connections as elements of the theory

This elaboration of theory 1 illustrates how a coherent set of beliefs has a tendency to become more comprehensive. But there is more to come. Suppose that somebody holds the beliefs of theory 2, but did not believe that there is any connection between the elements of this set. Would we then say that his belief set was coherent? Presumably not. The coherence of the set lies in the assumed connection between the elements. The belief in sentence 3 should be based on the beliefs in the sentences 1 and 2c. This assumption of relevance is not a factual belief as expressed in the sentences 1, 2a-c and 3, but should nevertheless somehow be part of the coherent theory, because its denial or even suspension of the assumption makes the theory incoherent. Theory 2 therefore naturally expands to the more coherent

Theory 3
1.   The butler had a motive to murder Lord Hard.
2a.   The butler was seen entering Lord Hard's room.
2b.   The butler entered the room.
2c.   The butler had the occasion to murder Lord Hard.
3.   The butler murdered Lord Hard.
4a.   1 expresses a contributive reason for believing 3.
4b.   2a expresses a contributive reason for believing 2b.
4c.   2b expresses a contributive reason for believing 2c.
4d.   2c expresses a contributive reason for believing 3.
4e.   3 expresses a contributive reason for believing 1, (2a, 2b) and 2c.

This is the occasion to make an important observation, namely that a theory not only contains independent beliefs, but also the links between these beliefs. The theory itself indicates that some of its elements are supported by

other elements and the other way round.[34] It is characteristic for the theory of integrated coherence that will be exposed in section 5 that the relations between the elements of a theory are not determined by rules or standards outside the theory, but are parts of the theory itself.

4.4   **Abstract reasons as elements**

Theory 1 turns out to have been not so coherent after all, because it needed expansion to theory 3. However, even additional expansion is necessary, because reasons do not stand by themselves. If some concrete fact is a reason for a particular conclusion, similar facts are normally reasons for similar conclusions. Another way to say the same thing is that reasons can be generalized. The result of such a generalization is an abstract reason that a fact like the current reason is in general a reason for a conclusion like the current conclusion. In the present case, for instance, one abstract reason would be that if somebody has a motive for murdering somebody else, this is a reason to believe that the former person murdered the latter. Such an abstract reason is not a statement which is true or false independent of the person for whom, or group within which it holds, but rather something which is accepted or not. Since concrete reasons can be generalized into abstract reasons and since it is incoherent to accept that a particular fact is a reason for accepting a conclusion without accepting the corresponding abstract reason[35], theory 3 must be expanded to make it include the abstract reasons underlying the concrete reasons expressed in the sentences 4a-4b:

Theory 4:
1.   The butler had a motive to murder Lord Hard.
2a.   The butler was seen entering Lord Hard's room.
2b.   The butler entered the room.
2c.   The butler had the occasion to murder Lord Hard.
3.   The butler murdered Lord Hard.
4a.   1 expresses a contributive reason for believing 3.

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[34] It may seem that a theory need not specify the logical relations between its elements and that this job can be left to logic. This overlooks, however, that logic is not something that is given independent of one's beliefs. Even a generally accepted form of logic, such as for instance predicate logic, presupposes a theory of what can validly be derived from what and such a theory requires acceptance just like one's beliefs. See also section 5 and - more generally - chapter 1.

[35] That this is incoherent presupposes a theory about the 'logical' behavior of concrete reasons, in particular that they can be generalised into abstract reasons. Such a theory should be part of a larger coherent theory. For the purpose of the present example, I simply assume that such a theory is already accepted.

4b.   2a expresses a contributive reason for believing 2b.

4c.   2b expresses a contributive reason for believing 2c.

4d.   2c expresses a contributive reason for believing 3.

4e.   3 expresses a contributive reason for believing 1, 2a, 2b and 2c.

5a.   If somebody has a motive to murder somebody else, this is a contributive reason to believe that the former person murdered the latter.

5b.   If something was seen happening, this is a contributive reason to believe that this actually happened.

5c.   If somebody entered the room of a murdered person, the former person had the occasion to murder the latter.[36]

5d.   If somebody had the occasion to murder somebody else, this is a contributive reason to believe that the former person murdered the latter.

5e.   If a conclusion of a reason to believe is true, this is a reason to believe the reason for this conclusion.

In particular the abstract reason formulated in 5e is interesting, because it underlies so-called abductive arguments.[37] If a fact would explain the occurrence of another fact, the occurrence of this other fact is in turn a reason to believe the explaining fact. The strength of this reason depends on the availability and the plausibility of other explanations. If the murder on Lord Hard would be explained better by the theory that his wife killed him out of jealousy, the fact that Lord Hard was murdered provides little support for the beliefs that the butler had a motive and that the butler was seen entering Lord Hard's room.[38] So the coherence of theory 4 presupposes a belief that there is no better explanation for the murdering of Lord Hard than the facts stated in the sentences 1 and 2a-2c. This belief in turn presupposes beliefs about other possible explanations of the murder of Lord Hard and standards for the comparison of the plausibility of different explanations.

   Clearly theory 4 is still in need of expansion. In particular it does not take possible reasons against the conclusion that the butler murdered Lord Hard into account. Drawing the conclusion that the butler committed the murder

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[36]   This principle does not sound convincing, which illustrates that the argument needs to be elaborated further than this paper allows place for.

[37]   Abductive arguments are arguments of the following form:
         Facts like P tend to cause facts like Q.
         A fact like Q occurred.
         Therefore: a fact like P occurred.

[38]   These two beliefs may nevertheless be true. In the indicated circumstances they only receive little support from the fact that Lord Hard was murdered.

presupposes the balancing of reasons for and against this conclusion, which asks not only for a decision about the relative weight of the reasons, but also for a judgment about the presence of all reasons for and against the conclusion. Most notably it presupposes that one has not only balanced the reasons for a conclusion against the reasons against in ones theory, but also that all relevant reasons are already part of the theory. In other words, the theory must contain all the reasons concerning a conclusion, including their relevance and their relative weight. Further elaboration of the theory would require more space than this chapter allows. Moreover, the elaboration would probably presuppose still other beliefs, principles or standards which should then be added to the theory and which would in turn presuppose other beliefs, etc ….

5.   CONCLUSIONS FROM THE CASE STUDY

What does the above sequence of theories illustrate? First and foremost, I think, why coherent theories, in the strict sense of coherence, must be comprehensive.[39] The elements of a small theory can only support each other if other elements are also accepted. This means that these other elements should also be part of the total belief set. Moreover, the additional elements lead to again other elements, etc …. Comprehensiveness is not only an additional requirement for coherent theories in the broad sense next to strict coherence, but rather a presupposition of strict coherence. The support relation between the elements of a belief set is weakened, if not destroyed, if the belief set does not also contain additional elements.

   This is especially clear from the abduction principle which will be part of most theories. The abduction principle depends for its application on the absence of other, more plausible explanations of the phenomenon that is explained by some reason. Application of the induction principle therefore requires a view of which alternative explanations are available and a theory of what makes one explanation more plausible than another explanation. Effectively this means that application of the abduction principle presupposes a theory about the nature of explanation and a theory about all

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[39] This point was also stressed by Sosa 1989, who argues that narrow reflective equilibrium, restricted to coherence within a particular domain, 'must be supplemented by wider reflection, at least to the point where we are satisfied that there is no other domain relevant to the topic under consideration' and to which he adds in a footnote that a domain could rarely, if ever, lie in total epistemic isolation.

facts that would provide possible alternative explanations and about their relevance.

The second point illustrated by the above sequence of theories is that the pursuit of a coherent theory is a never-ending enterprise. Every addition to an existing theory is a potential occasion to make new additions. In the end, a coherent theory would be a theory of 'everything'. Theories of everything are not realistic and the same counts for ideal coherent theories. In the practice of real life reasoning, the pursuit of coherence functions as a device for local belief revision. By pointing out that a theory in its present version is not coherent, one can move the holder of the theory to amend it, either by deleting elements from it, or by adding new elements. The result of such a change will never be a completely coherent theory, but if everything goes well, it is a more coherent theory. Coherence is not a characteristic that real theories can possess, but rather a *correctional device* to be used in the never-ending process of updating and (hopefully) improving existing theories.[40]

The insight that coherence is a correctional device is also important for another reason. A common objection to coherence theories is that they cut knowledge of from reality. If beliefs are only tested against other beliefs, the influence of reality on our beliefs would be lost.[41] This objection would be effective if all beliefs in one's stock of beliefs were there on a voluntary basis. However, we hold many of our beliefs spontaneously and sometimes even unconsciously. Think for instance of beliefs based on sensory perception. If one sees a chair, this will normally lead to the belief that there is a chair. This belief is presumably the direct consequence of seeing the chair, but it is not based on some reason, such as the reason that one believes to see a chair.

These spontaneous beliefs play a role in the construction of a coherent belief set. On the assumption that they somehow derive from reality, they guarantee that the contact between a coherent set of beliefs and reality is not completely lost.[42] It should be noted, however, that the assumption that spontaneous beliefs 'somehow' derive from reality does not imply that these spontaneous beliefs are always true, or even that they are justified. Spontaneous beliefs are merely 'there' and play a role in the construction of

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[40] This dynamic aspect of the pursuit of coherence is also mentioned by Bender 1989 (CJK), 8.

[41] Discussions of this objection can be found in Moser 1989, Pollock and Cruz 1999, 74/5 and Haack 1993, 26f.

[42] If one does not assume that spontaneous beliefs somehow derive from reality, it is unclear how any epistemological theory might salvage the relation between one's beliefs and reality.

a coherent theory. It will often occur that they are abandoned during the process of construction.

In this connection the famous metaphor of Neurath gives a good indication of the role of coherence.[43] According to this metaphor, 'we are like sailors who must rebuild their ship upon the open sea'. We start with a pre-existing body of spontaneous beliefs that is modified in order to make it coherent. Moreover, the process of modification never ends, if only because the entrance of new spontaneous beliefs never ends as long as one is able to perceive.[44] Coherence is a correctional device, a goal pursued in the processing the body of our beliefs.

The third point that I want to emphasize and which I already mentioned in connection with Thagard's theory of coherence as constraint satisfaction, is that the connections between the elements of a theory, the constraints in Thagard's theory, are themselves part of the theory in question. A coherent theory is in accordance with constraints that are part of the theory themselves.[45] This third point is the crucial one for the theory of integrated coherence: the support relations between the elements of a theory are not defined outside the theory, but are part of the very theory. It can also be made by stating that in integrated coherence, logic is part of the coherent theory and not something outside of it. In this way, a kind of Quinean holism is incorporated into the theory of integrated coherence.[46]

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[43] Neurath 1932/3.
[44] Probably the process of modification would even continue if there were no new input, but this remains a matter of speculation because we do continuously receive input of new beliefs.
[45] The idea that a theory sets itself the standards that it must satisfy is an extrapolation of the idea that a belief set also contains meta-beliefs. Cf. the discussion of meta-beliefs in Bender 1989 (CJK).
[46] Cf. Quine 1953 and 1986.