The fallacies of composition and division

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1. Introduction

In the pragma-dialectical conception of argumentation fallacies are defined as violations of rules that further the resolution of differences of opinion. Viewed within this perspective, they are wrong moves in a discussion. Such moves can occur in every stage of the resolution process and they can be made by both parties. Among the wrong moves that can be made in the argumentation stage are the fallacies of composition and division. They are violations of the rule for reasonable discussions that any argument used in the argumentation should be valid or capable of being validated by making explicit one or more unexpressed premises. In this paper the fallacies of composition and division are analyzed in such a way that it becomes clear that the problem at stake here is in fact a specific problem of language use.

2. Properties of wholes and the constituent parts

There are several ways of violating the dialectical rule that the reasoning that is used in argumentation should be valid or capable of being validated by making explicit one or more unexpressed premises. To make this clear, first, the argument has to be reconstructed that is used in the argumentation. Next, an intersubjective *reasoning procedure* has to be gone through to establish whether the argument is indeed valid (van Eemeren and Grootendorst 1984: 169).

A well-known violation of the validity rule consists of confusing necessary and sufficient conditions in reasoning with an 'If ... then' proposition as a premise. There are two variants. The first is the fallacy of *affirming the consequens*, in which, by way of a 'reversal' of the valid argument form of *modus ponens,* from the affirmation of the consequens (by another premise) is derived that the antecedens may be considered confirmed. The second is the fallacy of *denying the antecedens,* in which by way of a similar reversal of the valid argument form of *modus tollens* the denial of the consequence is derived from the denial (by another premise) of the antecedens.

There are also other violations of the validity rule. A violation that often occurs is *unjustifiably assigning a property of a whole to the constituent parts.* Or the other way around: *unjustifiably assigning a property of the constituent parts to the whole*. The properties of wholes and of parts are not always just like that transferable to each other. Sometimes the transfer leads to invalid reasoning:

(1) a This chair is heavy
b *Therefore:* The lining of this chair is heavy

But there are also valid variants:

(2) a This chair is white
b *Therefore:* The legs of this chair are white

What makes for the difference between the valid and the invalid variants? And why is this difference not always immediately clear? When the answers to these questions are known, it is easier to recognize - and avoid - mistakes.

3. Reconstruction of the argument form of part/whole argumentation

The form of the argument underlying both argumentation (1) and argumentation (2) can be described as follows:

(3) a X has property Z
b *Therefore:* All parts of X have property Z
c Y is a part of X
d *Therefore:* Y has property Z

In this reconstruction it is explicitly expressed that conclusion (d) refers to a part of the whole referred to in premise (a) and that this part has the same property as the whole. The premises (c) and (b), in which this is successively expressed, remain implicit in argumentation (1) and (2).

This reconstruction is, in fact, made up of two arguments, which are subordinatively related to each other. The first argument consists of (a) and (b), the second of (b), (c) and (d). The conclusion (b) of the first argument serves as a premise in the second.

The second argument has a valid form. When applied to argumentation (1) this part of the reconstruction leads to the following result:

(4) b All parts of this chair are white
c The legs of this chair are parts of this chair
d *Therefore:* The legs of this chair are white

And when applied to argumentation (2) the valid result is as follows:

(5) b All parts of this chair are heavy
c The lining of this chair is a part of this chair
d *Therefore:* The lining of this chair is heavy

The cause of the difference in validity between the reasoning in argumentation (1) and (2) can evidently not to be found in this part of the reconstruction, but in the first part. When applied to argumentation (1) and (2) this part of the reconstruction leads to the following result:

(6) a This chair is white
b *Therefore:* All parts of this chair are white
(7) a This chair is heavy
b *Therefore:* All parts of this chair are heavy

(6) and (7) represent the same argument form (3a,b), but in (7) the conclusion does not necessarily follow from the premise. The first part of the reconstruction is therefore invalid.

4. The crucial argumentation scheme in part/whole argumentation

The first part of the reconstructed argument form of part/whole argumentation has this form:

(8) a X has property Z
b *Therefore:* All parts of X have property Z

The argumentation scheme that is being used here is that of the *sign relation:* the fact that a whole (X) has a certain property is seen as a sign that the parts of this whole also have this property.[1] As is usual in such cases, the argumentation scheme that is employed can be interpreted as an unexpressed premise. In the case of (3), this unexpressed premise can be made explicit as follows:

(8') a' (What applies to the properties of X also applies to the properties of all parts of X)

From the invalidity of arguments such as (7), it becomes clear that the scheme does not always automatically apply. Obviously, certain preconditions need to be fulfilled to achieve a valid argument with the help of this scheme. This also applies to the reversed form of the argument:

(8'') a All parts of X have property Z
a' (What applies to the properties of the parts of X also applies to the properties of X)
b *Therefore:* X has property Z

The application of this scheme too can either result in a valid argument or an invalid argument. Examples are (9) and (10) respectively:

(9) a All parts of this chair are wooden
b *Therefore:* This chair is wooden
(10) a All parts of this chair are cheap
b *Therefore:* This chair is cheap

In (9) and (10), a sign relation is established in which the fact that all parts of the chair have a certain property (being wooden and being cheap respectively) is regarded as a sign that the chair also has this property. This is right in (9), but not necessarily in (10): a design Rietveld chair, for example, is made of material that is relatively cheap, but the chair is all the same expensive.

Neither the attribution of properties of wholes to parts (the argumentation scheme of 3)

nor the attribution of properties of parts to wholes (the argumentation scheme of 8) leads automatically to a valid argument. The validity of arguments in which one of the two variants of the scheme is applied is dependent on the *transferability* of the properties concerned. This transferability is determined by two factors: (a) the *nature of the properties* which are transferred and (b) the *relation between the parts and wholes.*

5. Absolute and relative properties

With regard to properties of people, animals or things a distinction must be made between *absolute* and *relative* characteristics. In case of an absolute property it can, in principle, be determined independently whether or not someone or something has that property. In case of relative properties, there is always an explicit or implicit comparison involved, either directly with something else, or indirectly with a standard, norm or criterion.

Terms, words or expressions that refer to absolute characteristics or properties are, for instance, the names of colors, of the fabric or the material of which something is made and adjectives that have to do with form or fixed facts such as inflammability or poisonousness:

(11) The legs of this chair are white
(12) The roof of this house is red
(13) This dress is made of cotton
(14) The stage decorations are made of cardboard
(15) The leaf of this flower has the form of a heart
(16) The village square is round
(17) This hotel is fire-risky
(18) The juice of the buttercup is poisonous

Terms which refer to relative characteristics or properties have, for example, to do with somebody's or something's weight, the measures (length, width, depth, size, contents, etc.), the strength, the price and the qualifications of the character, the appearance or other striking features:

(19) That bag is heavy
(20) That glider is light
(21) That dog is big
(22) That elephant is small
(23) That bear is strong
(24) The construction of that bridge is weak
(25) That boat is cheap
(26) My sister is nice

The relative character of the properties 'heavy', 'light', 'big', etc. is evident from the (implicit) comparative character of these terms: a *heavy* bag is a bag that weighs more than a bag weighs on average. This means that the bag is heavy when measured with the standard that applies to a bag. Which standard is exactly used in determining the weight of the bag is not mentioned explicitly; it is determined implicitly by the fact known to

every language user that a bag is meant for carrying and can be called heavy if it is relatively hard to carry. Of course, a different standard applies to the weight of a plane: a light plane is not a plane that can be carried easily, but a plane that can be kept more easily in the air than other planes.

Something similar applies to the terms *big, small, strong, cheap* and *nice.* The application depends on the standards, norms or criteria that are relevant to the category to which the people, animals or things belong to which the terms refer. Within the category concerned, a comparison is made with other members of this category. A big mouse, for example, is not a big animal, for within the category of the animals there are a great number of bigger sorts. The size of a mouse must be viewed within the category of the mice. A big mouse is a mouse that is bigger than the average mouse. For a mouse, it is big.

6. Structured and unstructured wholes

When valuing the relation between the parts and the whole a distinction must also be made between *unstructured* and *structured* wholes. An unstructured whole, or a whole 'without ordering', is not more than a collection of elements that together constitute the whole. The whole is, as it were, just the sum of the parts. Examples of the parts of such unstructured wholes are the peas in a tin, the drops in a pool of water and the grains in a heap of sand.

A structured or 'ordered' whole is more than the sum of the parts. It is different in the sense that there is a qualitative difference between the collection of elements and the whole constituted by these elements. Examples of the parts of such structured wholes are the sentences in a novel, the players of a soccer team and the parts of a machine.

The parts of unstructured and structured wholes can be distinguished terminologically by calling the first *elements of a non-ordered collection* and the second *parts of a coherent whole*.[2] Each collection of drops constitutes automatically a pool or puddle, but not every arbitrary collection of sentences is a novel. In the latter case, it is necessary that the sentences are ordered in a specific way into a coherent whole. The same applies, *mutatis mutandis,* to the players in a soccer team and the parts of a machine, but also to the parts of a house or a jigsaw puzzle.

Some properties that can be attributed to wholes are independent of the structure of these wholes while other properties are dependent on the structure of the whole. Examples of *structure-independent* properties are *brown, copper, heavy, light* and *big. Structure-dependent* properties are, for instance, *rectangular, edible, good, bad* and *strong.* A quantity of green peas automatically constitutes a collection that is also green, irrespective of whether the peas are separately on a plate or together in a tin. A collection of edible ingredients, however, does not automatically constitute an edible meal: then the ingredients need also to be mixed in a particular way.

7. The transferability of properties

As is shown by the example of the edible ingredients, structure-dependent properties cannot automatically be transferred from the parts of a whole to the whole itself. The

reverse is also not possible. From the observation that a jigsaw puzzle is rectangular it does not follow that all the pieces of the puzzle are rectangular. It is not even always the case that structure-independent properties are transferable from the parts to the wholes and the other way around. In the example of the green peas this is indeed possible, but in other cases it is not:

(27) a On this plate are only small peas (a number of small peas)
b *Therefore:* On this plate is a small quantity of peas (a small number of peas)

The difference between (27) and the original example of the peas is that in (27) the relative term *small* is used and in the original example the absolute term *green.* Obviously, a relative term refers to a property that cannot be transferred automatically from the parts to the whole, whereas with an absolute term this is possible in principle. Not always, however, witness the following example:

(28) a Natrium and chlorine are poisonous
b *Therefore:* Natriumchlorine is poisonous

Natriumchlorine is the chemical name for ordinary kitchen salt, which is not at all poisonous, but edible, even if it is composed of two mortally poisonous constituent parts.

The difference between (28) and the original sound example of the green peas, however, is again precisely that the term *poisonous* refers to a structure-dependent property while the term *green* in the original example refers to a structure-independent property. So the term *green* refers to a property that is absolute as well as structure-independent, the term *small* to a property that is structure-independent but not absolute, and the term *poisonous* to a property that is absolute but not structure-independent. Only *an absolute property which is also structure-independent* is transferable from the parts to the whole or the other way around.[3]

Non-transferable properties

In the light of the foregoing we can now say that a relative property that is structure-dependent is not transferable:

(29) a All players of the soccer team are world-class
b *Therefore:* The soccer team is world-class

In (29) it is not taken into account that the requirements for regarding an individual player world-class are different from the requirements that apply to a team. The property of being *world-class* is relative. A soccer team has to satisfy other requirements in order to be world-class than that the individual players have the qualities that make each of them world-class. The players must, for example, be adjusted to each other, otherwise there is no good team, let alone a world-class team. The property of being *world-class* is structure-dependent.

A structure-independent relative property is also not transferable:

(30) a This machine is composed of light parts
b *Therefore:* This is a light machine

The total weight of a machine is not dependent on the way in which it is constructed. The property *light* is here indeed structure-independent. The criterion for determining whether the parts of a machine may be called *light*, however, is different from the criterion for determining whether the machine as a whole may be called *light*. In the case of the parts, the material of which the parts are made will be compared with the alternatives: aluminum, for instance, is lighter than crude iron. In case of the machine as a whole, it reasonable to look at other machines: a photo-copying machine is lighter than an agricultural machine. Therefore it would be strange to call an agricultural machine which is altogether made of aluminum a *light machine*.[4]

The non-transferability of an absolute and structure-dependent property can be demonstrated with the help of the following example:

(31) a All parts of this figure are triangular
b *Therefore:* This figure is triangular

The term *triangular* refers to the form of something and that form is not dependent of the size or something similar. For referring to the form of small things no other criteria apply than for referring to the forms of big things. The property of being *triangular* is indeed absolute. The following two figures can be of help to make clear that this property *is* structure-dependent:

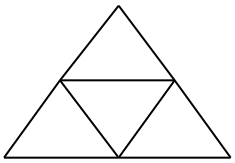

Figure 1

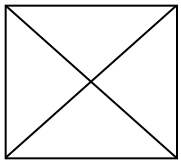

Figure 2

Figure 1 is triangular, but figure 2 is rectangular, whereas both of them are built of four triangles. The only difference between the two is the manner is which the triangles are put together in the two figures. In figure 1, the composition is such that the conclusion of (31) is true; in figure 2, this is not so. So the reasoning that is expressed in the argumentation of (31) does not guarantee that from true premises (such as those in the two figures) follows a true conclusion. The argument is therefore invalid.

8. Characterization of the fallacies of composition and division

The relation between the absolute or relative character and the structure-independency or structure-dependency of a property on the one hand and the transferability of this property between parts and wholes on the other hand, is indicated in figure 3:

Transferable (+) and non-transferable (-) properties	structure-independent properties (2a)	structure-dependent properties (2b)
Absolute properties (1a)	red, white, blue, glass, iron, wooden (+)	round, rectangular, edible, poisonous (-)
Relative properties (1b)	heavy, small, light, big, fat, slim (-)	good, expansive, strong, poor (-)

Figure 3

Only combination 1a/2a leads to a transferable property, which can result in a valid argument. Combinations 1a/2b, 1b/2a and 1b/2b lead to transferable properties; an argument in which such a combination is used is in all cases invalid. This means that in all these cases the reasonableness rule is violated that says that the arguments used in an argumentation should in principle be valid. The fallacy resulting from such unjustified transfer of properties between parts and wholes has two variants: (a) *unjustified transfer a property of the parts of a whole to the whole*
and (b) *unjustified transfer a property of a whole to the parts of the whole*.

In the first variant of this fallacy a property of the parts leads to a wrong combination with regard to the whole. Variant (a) is therefore called the fallacy of *wrong combination* or simply the *composition fallacy.* In the second variant a property of the whole is wrongly distributed over the parts. Variant (b) is therefore called the fallacy of *wrong distribution* or simply the *division fallacy.*

A nicer example of the composition fallacy can be found in the first Albert Verwey lecture by Gerard Reve, when he argues that there is an anti Catholic climate in the Netherlands *(NRC Handelsblad,* November 2, 1985):

> Looking back at the anti Catholic fury of this year in the Netherlands, we see that, *mutatis mutandis,* exactly the same conditions are fulfilled [as in the Thirties]. The accusations that are now made against the Roman Catholic Church are just as nonsensical as those that were then made against the Jews. You know what I am talking about: the Church does not take action. Or: the Church interferes too much in politics. Or: the Church keeps itself outside politics and remains deaf to the social needs. Or: the Catholics are part of everything and always manage to get things their way. Or: Catholics are always sticking together and exclude everybody else from their plotting clique. Or: the Church is very rich. (Just an aside: this is not so. The Church is very poor, because it is mainly a Church of poor people. Rich people do not need a God.)

The argumentation in the closing part in parentheses contains an argument which can be reconstructed as follows:

(32) a The Church is a Church of poor people
b *Therefore:* The Church is poor

In (32) it is not taken into account that the property *poor* is relative and also

structure-dependent. First, different criteria are to be applied for determining the wealth of individual people than for determining the wealth of a church: the wealth of people is determined by comparing their income and possessions with those of other people, the wealth of the Roman Catholic church by comparing it with that of other churches or similar institutions. Second, there is no structural relation between the wealth of the individual members of a church and the wealth of the church as such. The wealth of the church can be determined by still other factors than the donations of its members and further it also depends on what part of their income and possessions the members donate to the church.

Similar analyses can be made of the division fallacy. We leave it here at a brief example:

(33) a The cabinet is irresolute
b *Therefore:* The ministers are irresolute

In (33) it is not taken into account that the (absolute) property *irresolution* is structure-dependent. A cabinet can only take decisions if the members of the cabinet can reach an agreement. It is perfectly possible that all members are very resolute, but happen to want quite different things. Then the cabinet as a whole can not so easily make a decision and it is 'irresolute'.

9. The identification of composition and division fallacies

In the light of the evident invalidity of the examples in which a wrong combination (10, 28, 29, 30, 31, 32) is made, or a wrong distribution (2, 7), it looks as if composition and division fallacies can be easily recognized as violations of the validity rule. Sometimes this is indeed the case. The easiest are, of course, those cases in which it is immediately clear that the criterion for attributing a relative property to a whole is quite different than that for attributing it to the parts or in which it is immediately clear that the way in which the whole is structured makes it necessary to attribute entirely different properties to the whole than to the parts.

In practice, however, it need not always be that simple. Although the criteria for the attribution of the properties may vary and it may also be the case that the properties themselves vary because of the structure of the whole, this is often not clear from the terms that are used to refer to these properties.[5] There are cases in which the same term is used to refer to the properties of the whole as to the properties of the parts.[6] Because of this, there is a risk that the differences are overlooked and the properties of the whole and the parts are confused:

(34) a An elephant eats more than a mouse
b *Therefore:* Elephants use more food than mice

In (34) the term *more* is used in premise (a) as well as in conclusion (b). In both cases it is also a normal term to use. For this reason, the argument seems, at first sight, even valid. Its invalidity becomes clear when one realizes that the 'property' *eats more than* is relative. If used in connection with the elements of a set or collection, the expression 'eats more than' has to be tested by using a different criterion than when it refers to the

set or collection as a whole. In (a) the expression is rightly used if it is indeed the case that an individual elephant consumes daily a larger quantity of food than an individual mouse (and this is indeed the case). In (b), however, the issue is not the individual consumption of elephants and mice, but the total consumption of the collectivity of elephants and the collectivity of mice. Not only the difference in individual consumption plays a role then, but also the number of elephants and the number of mice that consume the food. It stands to reason that in the individual comparison this criterion plays no role. The difference in the criteria that must be applied is ignored in the argument (as is the fact that there are many more mice than elephants). Therefore in this case the transfer of the property *eats more than* is incorrect. Because this property of the parts is transferred to the whole, this is an example of the composition fallacy.

When identifying the composition and division fallacies it is always very important to check properly whether in the given situation the transferred property is indeed justifiably transferred. A complication is that the terms that are used to refer to properties, when viewed superficially, neither differentiate between absolute properties and relative properties nor between structure-independent properties and structure-dependent properties.[7] This means that it has to be determined for every separate case what kind of properties the term that is used refers to and whether or not the combination of properties in the whole and the parts corresponds with the conditions for a sound application of the part/whole argumentation scheme represented in figure 3.

Notes

1. In an argumentation scheme based on a sign relation the starting point is that what is asserted in the standpoint is a symptom, expression or other sign of what is said in the argument or the other way around. See van Eemeren and Grootendorst (1992: 94-102, 158-168).
2. Our distinction between unstructured wholes or non-ordered collections on the one hand and structured wholes is more or less identical with Hamblin's distinction between *physical* and *functional* collections (1970: 21).
3. In connection with the non-transferability of properties of parts to wholes or the other way around, Woods and Walton speak of *compositionally* and *divisionally hereditary* properties respectively (1982: 206-207). For determining the transferability of properties they make use of Burge's theory of aggregates. See for an extensive exposition of this theory in relation to the composition and division fallacy Woods and Walton (1982).
4. The same applies when instead of the average norm a functional norm is applied. If the property of being light is interpreted as 'easy to carry', a light agricultural machine is still heavy.
5. Due to the fact that the relative and structure-dependent character of terms for properties is not formally expressed at the surface level, statements with such terms are 'indeterminate' in Crawshay-Williams's (1957) sense. This means that it cannot be determined just like that whether these statements are false. In order to be able to do that, the context of the statements needs to be made explicit first.

According to Crawshay-Williams, this means that one should indicate for what purpose the statements are made. This would mean here: which standards should be used for evaluating them. See for a discussion of Crawshay-Williams's approach van Eemeren et al. (1996).

6. The relative terms in the examples of composition and division fallacies are all the same not ambiguous in the ordinary linguistic sense. That is the reason why we do not regard them as fallacies of ambiguity. Textbooks in which a different approach is taken are Copi (1982: 124-128), Engel (1982: 93-95), and Rescher (1964: 76). Much earlier, Rowe (1962) argued already emphatically that these fallacies are not fallacies of ambiguity.
7. An additional source of confusion is that there are cases in which the terms that are used to refer to a property are applicable both to the whole and the parts. Another complication in identifying the composition and division fallacy is that this fallacy can also be committed in combination with one or more other fallacies. See van Eemeren and Grootendorst (1992).

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