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The Fallacy of Composition

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ABSTRACT: The fallacy of composition involves differing relationships of parts to wholes complicated by the problem of group ambiguity. Our discussion begins with a brief diagnosis of important features of the fallacy. We consider a common implicit assumption and the main factors that contribute to its acceptability. Our focus will be on illuminating some common strategies rather than formal material conditions for the fallacy. This is to facilitate the critical discussion of possibilities for this fallacy.

KEYWORDS: absolute property, aggregation, composition, collectivity, distributive, group ambiguity, parts-whole relationship

1. INTRODUCTION

It is quite surprising that many critical thinking textbooks do not contain any significant discussion of the fallacies of composition and division.¹ Even in the ones that do offer an account of the fallacies, the explication is often superficial and cursory. Many of the same sorts of examples are recycled and there is an alarming lack of examples from actual arguments. Concocted examples are created to match or satisfy the specific features of the fallacy of composition and not natural arguments which are discovered from everyday discourse. Moreover, there is a tendency for the fabricated textbook examples to be less than serious failures in reasoning with some examples bordering on attempts at humour.

¹ For a non-prejudicial, non-systematic and not necessarily representative set of such texts, which seem to provide no reference or insufficient treatment of the fallacy of composition, see Wright (1989), Cederblom and Paulson (1996), Nosich (1982) and Hoaglund (1984). Texts which emphasise approaches to informal logic which focus on formal logic and those which do not give much emphasis to the fallacy approach to evaluating reasoning would for these reasons not give much attention to the fallacies of composition and division.

For example, the claim that: “All members of the Toronto Maple Leaf hockey team are good hockey players, so the team is a good hockey team” generates a humorous response from those who know the team’s poor scoring record over the last forty years and this is significant because this humour may be at the expense of genuine insight. To understand under what conditions a mistake in reasoning occurs can help to prevent its occurrence in the reasoning of those so informed. As Nolt points out, many created instances of the mistake “are just silly” and are not worthy of much serious consideration nor likely to be committed by intelligent arguers.² This paucity of explication in textbooks is lamentable since the fallacy is easy enough to commit and nocuous enough to avoid committing. For the purposes of this paper, we will focus our attention on the fallacy of composition although the same sorts of considerations apply to division since they are “opposites.”³

Our discussion will begin with a brief diagnosis identifying some of the important features of the fallacy. We then consider a common implicit assumption and the main factors that contribute to the acceptability of this assumption. Finally, an evaluation of three actual examples of fallacious composition allows us to further explicate when it has been committed and how to learn from it. Our focus will be on illuminating common strategies and procedures rather than providing formal material conditions for the fallacy.⁴

2. A BRIEF DIAGNOSIS OF THE FALLACY

We begin with an introductory example. Economics has two sub-branches that are related as part to whole and so the discipline is particularly susceptible to the fallacy of composition. In the move from micro to macro-economics, key concepts in one are often transformed into the other since reasoning applicable in one sphere may be maladaptive in the other. The *Paradox of Thrift* is a case in point. If you, as an individual, decide to save more, and reduce your debts, you will increase your wealth. But if everyone in the economy were to save more of their income and cut back on their consumption, this may reduce national wealth. The reduced incomes of one group of individuals may lead to reduced purchases by them which in turn may cause a further reduction in the income of others by reducing sales, the production of goods, the income of producers and their employees, and finally national saving and investment. What is reasonable at the micro level may have devastating ramifications when compounded at the macro; especially for an economy in the grips of a recession. One can call this an unintended, but painful consequence but one should not be surprised at this outcome. This situation is paradoxical only if one uncritically affirms the claim that what is good (or true) for the part is equally good (or true) for the whole. And, as we shall show, the status of this assumption is problematic since at some times it is appropriate but at other times it is not. Understanding this assumption and the conditions that determine its acceptability or unacceptability is crucial to a theoretical understanding of fallacious composition.

² See Nolt (1984, p.258). See also, Damer, (2001, p.112) who points out that “some cases of the fallacy of composition are so obviously flawed that we have probably never heard them uttered.”

³ Our analysis of the fallacy of composition applies to its opposite, the fallacy of division. They are (it is generally agreed) “two sides of the same counterfeit coin” as outlined in Woods and Walton (1977, p.381).

⁴ See Barker in (1989, pp. 163-164) who provides a formal response indicating that “this argument cannot be correctly translated into a syllogism, for we cannot word it so as to consist of categorical sentences containing just three terms.”

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The fallacy of composition has to do with the relationship of part to whole compounded or exacerbated by the problem of group ambiguity. Here is a representative definition, by Halverson (1984, p.73), of the transgression:

The fallacy of composition consists in treating a distributed characteristic as if it were collective. It occurs when one makes the mistake of attributing to a group (or a whole) some characteristic that is true only of its individual members (or its parts), and then makes inferences based on that mistake.

Put differently, a term that is used distributively in the premises is interpreted collectively in the conclusion as one shifts from a consideration of the parts of a whole to a statement about the whole itself.

Historically, attention to the fallacy has followed one of two trajectories.⁵ One tradition arises from the account of the fallacy presented in the *Sophistical Refutation* and concerns an explication of linguistic confusions that arise where the sense of a statement changes depending on whether the speaker combines what is divided or divides what is combined. The modern understanding of the fallacy, and the one that concerns us here, is genealogically affiliated with the treatment of extra-linguistic parts and wholes found in the *Rhetoric* where the error lies with “the assumption the hearer is meant to supply” (Tindale 1999, p. 170).

Key to understanding the fallacy is to note the difference between collective (the group as a whole) and distributive (the individual members of a group) predication. For example:

- The Sutter (well-known Canadian hockey family) brothers hockey players are both numerous and talented.

The property of being numerous is being predicated of the Sutter brothers hockey players as a group (i.e., collectively), whereas the property of being talented is being predicated of each of them individually (i.e., distributively). Fallacious composition consists in treating a distributed characteristic as if it were a collective. It occurs when one makes the mistake of attributing to a group (or a whole) some characteristic that is true only of its individual members (or its parts), and then make inferences based on that mistake. The composition fallacy is best understood as a problem complicit with and complicated by group ambiguity because it results from the fact that ordinary language often fails to make clear whether a term is being used to identify a property that refers to the members of the group individually or whether the same term is used to identify a property that refers to the group collectively. The composition fallacy can work in the opposite direction while exhibiting the same general problems of distribution as in the claim “the biggest raise increase ever given by the province” which is a case in point. (Brooke 2009, p. 78)⁶ While an individual’s pay may not have increased by the largest

⁵ This is the Kretzmann Thesis discussed in Woods, Irvine and Walton (2000, pp. 384-5).

⁶ This is similar to the following example. “Like other types of ambiguity, grouping ambiguity can be used intentionally to interfere with clear thinking. A few years ago, federal taxes were increased, and opponents of the change referred to it as ‘the biggest tax increase in history.’ If true, that makes the increase sound pretty radical, doesn’t it? And it was true, if you looked at the total tax revenue that was brought in by the increase. But this result was largely due to the numbers of people and the circumstances to which the

percentage, the amount collectively, as a line item in the budget, may have. Political parties of every stripe consistently peddle this legerdemain. In this case, the mistake is called the fallacy of division. It is now useful to consider the central implicit assumption inherent in the case of the fallacy of composition to determine whether this assumption added as a missing premise could render the argument cogent or not.

3. DEALING WITH THE IMPLICIT ASSUMPTION

The fallacy of composition arises when reasoning from part to whole or with mistaking members of a group with the group itself. Typically, two factors contribute to the fallacy: the parts-whole relation, and the collective-distributive distinction. For example:

- The best players will result in the best team

One can reconstruct this as an argument with a missing premise or assumption:

1. All the players in the team are the best in their position.
 2. What is true of the parts of a whole is also true of the whole. (Missing Premise)
- C: This is the best team.

In this example, a conclusion about the group is reached on the basis of premises about its members. It is clear that the missing premise (hereafter MP) is unacceptable since the best team is more than a collective of supremely talented individuals. The players may not mesh or work together as a team. The trouble is that there is no mechanical way of determining in advance whether the MP is acceptable (Woods, Irvine and Walton 2000, p. 265); sometimes it is, and sometimes it is not. Nevertheless, to determine whether the fallacy of composition has been committed, two factors need to be attended to: a) the precise nature of the constituent part(s) being transferred to the whole; b) the nature of the whole under consideration. The context of the inference, together with specific facts about the world, is often needed to distinguish between legitimate and illegitimate inferences. For example, how a thing with a specific property behaves in one medium may be quite different when the property is transferred to another medium; a property of something that is just fine in water may curdle in milk.

It is tempting to think that the structure of the inference—all the parts x have O; therefore, x has O—will provide help in identifying the fallacy. Here are two examples with this argument structure that are clearly egregious examples of the fallacy:

- I understand every word in the article, so I must understand what the author is saying.
- All the ingredients you are using are yummy, so the goulash is sure to be yummy.

increase applied. If we look at the percentage increase paid by individual taxpayers, this was not the biggest increase in history.

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Yet, as Rowe has persuasively demonstrated, the problem does not lie solely with the structure of the inference. Sometimes this telescoping of part to whole can be entirely appropriate. Among his counter-examples are:

- All the parts of the chair are brown; therefore, this chair is brown.
- All the parts of this desk are made of metal; therefore, this desk is made of metal.

We will not rehearse Rowe's argument, but his conclusion is inescapable:

we can have no formal or general characterisation of the fallacy of composition. What we can say is that the fallacy of composition is committed in certain, but not all, arguments which make the inference: all the parts x have O; therefore, x has O. (Rowe 1962, p.92)

As such, it may not always be illegitimate to infer that a whole has a certain property from the observation that all of its constituent parts have that property. Damer reinforces this idea when he asserts that "the fallacy (composition) should not be confused with the fallacy of inferring something about a whole class of things on the basis of one or a few instances of that thing. That fallacy has to do with insufficient evidence. Rather the fallacy of composition is using an unwarranted assumption that we can infer something about a characteristic of some whole based on a characteristic of its parts." (Damer 2001, p. 112) Sometimes a collective whole does have the characteristics of its individual parts since a series of good lectures is a good series of lectures.

Van Eemeren and Grootendorst (1999)⁷ offer an elegant insight to this part of the problem. Their suggestion is to check to see whether the property being transferred is an absolute (brown, square, acidic, etc.) property rather than a relative property (big, poor, etc.). Gold is gold irrespective of what possible world it is located in whereas whether someone is wealthy is context dependent. A relative term is one which involves an implicit comparison and so has its sense circumscribed within a context. If it is a relative or comparative property, the inference from part to whole will be illegitimate since the property cannot be detached cleanly. But this is only half the story. Consider the following example which is very similar to the one offered by Rowe:

- All the parts of the cookie are brown. So, the cookie is brown.

Trudy Govier observes that the above argument

is open to criticism because its form ignores the structural difference between parts and wholes. There is an element of luck [...] This case just happens to be one in which the whole does not have relevantly different structures and relationships from its parts. (Govier 2005, p.318)

Put differently, just because the property being transferred is an absolute property (i.e., brown), that is by itself no guarantee of legitimate reasoning since mistaken composition also occurs when

⁷ There is no page reference available since it's from a festschrift for van Benthem and exists as a CDROM.

the reasoning ignores *structural* distinctions between parts and wholes. A whole is often something over and above the sum of its parts, because it is characterised by elements in particular relationships.” (Govier, *ibid.*)

A choir of individuals with average vocal ability can transcend their individual limitations and be an excellent choir. Put differently, it matters what sort of whole or aggregate the property is being transferred into.

When considering aggregates it is important to recognise that there are different kinds of aggregates. A distinction between a “mere collection” and an “organised whole” helps to make this point. A collection of drops of water constitutes a pool or puddle of water whereas not every collection of notes is a melody. At times, it may be quite difficult to tell whether there is an organising principle in the aggregate that combines the parts into a whole or whether the seemingly ordered aggregate is accidental or external. For example, swarming bees can be viewed as a collection of insects or as a conglomerate collectivity.

Accordingly, an aspect of sorting out whether fallacious composition has occurred depends upon a determination of whether the aggregate is heterogeneous and differentiated or homogenous and undifferentiated. If the property of the part being transferred is absolute and it is being transferred into an undifferentiated homogenous whole, then the MP is acceptable and the argument cogent. For example, if a bean is put into a package of other such legumes, you can easily go from this bean is green to this is a package of green beans without committing a fallacy. As Damer advises, “it is important to recognize that wholes are not always different in character from their parts. For example, even if every cup in the punch bowl is sour, it would be entirely warranted to draw the conclusion that all the punch in the punch bowl is sour.” (Damer 2001, p. 113) In this case the MP premise (what is true of the part is also true of the whole) is acceptable and fallacious composition avoided. Otherwise, if the transfer concerns one of the following combinations—relative property of part to homogenous whole, relative property of part to heterogeneous whole, absolute property of part to heterogeneous whole—the transfer from part to whole will be illicit.

Establishing the acceptability of the MP—that properties true of all parts always compose—is critical to determining whether an argument runs afoul of the fallacy of composition. This will depend on the precise nature of the property being transferred. As we showed about, a relative property cannot be transferred automatically from the part to the whole, whereas with an absolute term this is possible in principle. If one is dealing with a relative property, which is characteristic of the part, then the MP will turn out to be unacceptable. Much also depends on the precise nature of the aggregate in question. Although homogenous wholes are not always different in character from their parts, with heterogeneous aggregates, the sum may be greater than the parts. Certain sorts of aggregates can create emergent properties. An emergent property is something that is attributable of the whole but not of the individual parts. The way the parts relate with each other often changes the character of the aggregate. For example, wetness is an emergent property. Water molecules are not wet, but clump a bunch of them together and wetness emerges. An emergent property that pertains to the whole is not decomposable to its individual parts. Determining the nature of the whole in question is thus critical to a determination of the acceptability of the MP. With the identification of the implicit assumption in arguments with the fallacy of composition and the differing nature of the

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transfers from part to whole, it will be instructive to move to some concrete examples where the fallacy has been identified.

4. EXAMPLES OF THE FALLACY OF COMPOSITION

In this section we consider some examples of actual arguments that commit the fallacy of composition to illustrate how one determines when the fallacy has been committed and what, if any, lessons can be learned from the composition strategy. We do this by showing that the same general missing premise (MP) in these arguments—what is true of the parts of a whole is also true of the whole—when made explicit, is unacceptable and hence, the arguments are not cogent. Nevertheless, we suggest that even though they commit fallacious composition, they may still be useful, and should not, on pragmatic grounds, be disdainfully dismissed.

1. The *Paradox of Thrift* is an economic phenomenon, which is why governments and not individuals feel compelled to stimulate the economy by introducing more liquidity into the system. The mistake of composition (Woods, Irvine and Walton 2000, p.263) is not deliberately made by each economic participant but rather occurs inadvertently as an emergent property. It remains true that there is a gap between the micro-economic behaviour of individuals and the macro-economic workings of the system which cannot be adequately bridged. This is a feature of composition that could be condemned on logical grounds but is instructive and pragmatically important in our understanding of the failure of micro expectations to match macro considerations.

The MP that the whole behaves identically to the parts is unacceptable because we are going from a micro situation to a macro situation and the propriety of the part that we are transferring “in a time of recession, saving money and cutting back on my debt is in my best interest” is dubious. Saving money and cutting back on my debt (the strategy used by Hoover as he tried to deal with the Great Recession in the States) only makes things worse at the macro level. This economic phenomenon at the macro level calls for a real economic response. And, the incorrect response is for the government to mimic the response of an individual.

2. The *Problem of Aggregation* is highlighted by Stephen Haller in his discussion of the climate change debate. (Haller 2002, p.48) Haller introduces his argument with a brief discussion of the attempt to arrive at a global averaging of pollution. He cautions us that there are different kinds of pollution such that, when combined, the result of these two forces is not simply an average or composite. This sort of argument, he avers, commits fallacious composition. The MP is unacceptable since there is an attempt to take pollution levels at the parts level that are not absolute (they are dependent on the context of the micro situations in which they emerge) and transferring them to the whole when the whole is neither undifferentiated nor homogenous. In these sorts of cases, where the parts being transferred are not undifferentiated and absolute, attempts to combine pollution that arise from two types of subsystems can often be surprising: “The behaviour of fly ash under conditions of turbulence and electric charge is altogether unlike what understanding of either of both sets of laws would lead us to believe.”⁸

⁸ Haller, here, is quoting Ian Hacking (2002, p.48).

For Haller, global averaging is misleading since we cannot tell whether we are dealing with a homogeneous aggregate or a heterogeneously structured aggregate and each deserves its own risk assessment. Still, if all that is intended is to come up with a “general representation” then it should not be a problem; all that is being offered is a generalisation. The problem arises when what is needed is greater precision in order to make accurate predictions. Here, the failure to distinguish between types of wholes is both unhelpful and mischievous.

[A]ggregation might lead to misleading conclusions about the limits of an entire system when, in actual fact, there might be only localized limits and regional problems. (Haller 2002, p. 49)

An individual pocket of pollution of some part of the ecosystem need not necessarily impact negatively against the eco-structure but could, on some occasions, actually contribute to eliminating some problems when compounded with other pollutants. For example, increasing pollutants to the oceans which create more algae could have the positive effective of providing more food for some species of the aquatic population of the oceans, which has a positive effect on other species in danger of extinction for lack of food, and so on. That is, it is possible to aggregate some individual pollutants and not produce any overall catastrophic effect. Sinking aging ships may appear as a simple case of polluting the ocean with scrap when it has the beneficial effect of creating the conditions for the expansion of beneficial coral reefs.

However, when scientists add the climate data from various *regions* of the world into one large grid, then (while ignoring regional differences) use this average (which is a relative number to the regional situation) to conclude that the *global ecosystem* is about to undergo an irreversible, catastrophic collapse, the composition mistake becomes more dangerous. The transfer from a set of parts in which “we are still unable to generate descriptions of the interactions among the components” to a heterogeneous whole or ecosystem is illegitimate. Hence Haller charges that: “To group and average in this way is to commit the fallacy of composition.” (Haller 2002, p. 50) Making explicit the MP that the whole ecosystem should act like the constituent regional parts simply helps bring the mistake to the fore.

The situation is mitigated if we use the connection to simply produce a general representation so that global circulation models are linked to the regional data. If so, the representation may still be considered useful since the representation will provide a basis for a possible better understanding of our dire global situation, when it comes to climate fluctuations. For Haller, both arguments, the pollution and the global averaging argument, as well as the catastrophic collapse argument, commit the fallacy of composition. In one sense, as long as we are only using the generalisation as clarion calls, then fallacious composition reasoning may be benign. But if the aim is to use the generalization as the basis for future extrapolation and research, then using the result of these arguments that employ false composition will be pernicious.

3. The *Confusion of Factual Possibility with Actual Ability* is described by Elster (1985 p. 211) as an instance of fallacious composition. Elster argues that the fallacy of composition is committed when from (i) “the fact that any given worker is independent of any specific employer” we infer (ii) that this worker is free from all employers” to conclude that (iii) “all workers can achieve (such) independence,” with (iii) then used to

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support the general controversial claim that: (iv) “the worker remains in the working class by choice rather than necessity.” (Note, that (iii) refers, in Marx’s characterization, to a heterogeneous, structured whole, and (i) refers to a specific sector, relative to specific circumstances and situation, while (iv) makes a general claim about all members of the class of workers in a capitalist society.)

Elster places the emphasis on the equivocation of “can” implicit in the argument. It means both “free to choose” (opportunity) one’s employer in one sense and “able to choose” (ability) one’s employer in another sense or free to choose to become a capitalist in one sense and free to choose to function as a capitalist, in the other sense.⁹ The freedom possible in the first case is not identical to the freedom possible in the second case. It seems as if (iv) emerges as an absolute claim from (iii). However, this is to transfer from a relative situation—specific employment conditions—to a differentiated global whole and such a transfer is clearly fallacious. Supplementing the argument with the MP makes explicit the mistake since these are not absolute properties in the parts that are being transferred to an undifferentiated, homogeneous whole. While the argument is clearly fallacious, it tells us much about the attempt to generalize about the set of workers from confusion in the conditions of their specific working conditions. Here the failure to detect the fallacious argument is pernicious.

What can we say about all these examples? First, they illustrate that the fallacy of composition can occur in a varied set of circumstances about a varied set of actual topics where the stakes are high. Second, the way the mistake is made varies in specifics but is uniform in its general features involving composition, aggregation and implicit part-whole relation. Finally, we can appreciate that committing the fallacy does not condemn the expository component of the strategy employed to enhance our understanding of some serious problems about the topic areas. If anything, it refines our understanding of the inherent problems in inferring from micro considerations to macro systems in economics, the environment and politics.

5. CONCLUSION

We have argued that the fallacy of composition is best understood as a complex of strategies involving differing relationships of parts to wholes, some involving illegitimate transfers from properties of parts to wholes. The compass of textbook versions of the fallacy, we suggest, should include significant discussion of all the following: the structural components to the mistake; the problem of group ambiguity; the significance of the difference between undifferentiated or homogenous aggregates and structure-dependent wholes, heterogeneous aggregates when it comes to legitimate transfer of claims; and, the possibility of emergent properties. The richness of an explanation of the fallacy illuminates components of the mistake that separate it from faults that it could be confused with, like hasty generalization. Finally, it is less important to isolate and identify a fallacy as the identification of a reasoning fault per se but rather to strive to see

⁹ The terms “formal freedom” and “efficient freedom” as used by Adam Swift (1998 pp. 55-59) may work more effectively to designate the distinction but we leave the wording with Elster’s original use.

that the structure and strategies are important clues as to how we reason and how we can gain some insight even from fallacious reasoning.

[Link to commentary](#)

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