Inductive Argument : Basics.

Actual generalization and particularization

The following might be presented as the valid moods of generalization from particular propositions, whether obtained by induction or deduction, to illustrate its basic method.

I → A
Knowing that some S are P,
and not having found any S which are not P,
we may induce that 'All S are P'.

O → E
Knowing that some S are not P,
and not having found any S which are P,
we may induce that 'No S is P'.

I + O, knowing some S to be P and some not to be P, inhibits generalization.

Lastly, not having found any S which are P or any S which are not P, strictly leaves us with nothing to say.

However, in practice, if research was made, we might tentatively induce that 'No S are P' or 'All S are P', preferring the **E** conclusion if P is in content a positive quality, or the **A** conclusion if P is in content a negative quality. A distinction is here made between presence and absence of something, which cannot be expressed in formal terms, but is comprehensible. Such generalization concerns, not so much the subject-matter of our propositions, but the process of observation itself.

The reverse process of particularization, is also noteworthy. We start with a general proposition, obtained by generalization or deduction, and a new observation which contradicts it; granting that the latter and its sources more credible than the former, we scale it down for consistency. Thus:

A + O → IO
Having supposed that all S are P,
but finding some S not to be P,
we conclude that 'only some S are P'.

E + I → IO
Having supposed that no S are P,
but finding some S to be P,
we conclude that 'only some S are not P'.

In practice, faced with such a situation, we might try to mitigate the result, by reformulating the original general thesis, so that we retain a generality. In the above, this would mean altering the subject, by delineating exceptions to it or substituting a narrower subcategory of it, and/or altering the predicate, by widening it (in positive cases) or narrowing it (in negative cases). Thus, suppose S1 and S2 are subspecies of S, and suppose P' is a genus embracing P among others, and that P1 and P2 are subspecies of P, then:

in **A + O → IO**, we may review the initial All S are P, to:

- All S1 are P (and No S2 is P), or to:
- All S are P' (though only some S are P).

Here, we narrow the subject or widen the predicate.

in **E + I → IO**: we may review the initial No S is P, to:
- No S1 is P (and All S2 are P), or to:
- No S is P1 (though some S are P2).

Here, we narrow the subject or narrow the predicate.

A pitfall in generalization is selection of too broad a subject-concept, or too wide or narrow a predicate-concept, when formulating the initial observation.

When particular entities are observed as having a certain property, the question arises are they so *qua* being of some species classification (like crocus, say), or *qua* belonging to some genus (like flowers, say). If we are tempted at the outset to adopt the genus as our subject, we may soon be disappointed, and have to later retract, and particularize the property down to the species, as above. Alternatively, we may be cautious, and adopt the species as subject, and later, finding the wider statement true, would generalize as follows:

All S1 and all S2 are P,
S1 and S2 are all the species of S,
therefore, All S are P.
Here, we broaden the subject.

Likewise, we may initially select a too limited predicate (e.g. blue) or a too vague one (e.g. colored), and later be obliged to qualify our assumption, as shown above.

Either way, in the long run, the correct subject and predicate should impose themselves, assuming the pursuit of knowledge is continued. So the process is not in itself flawed, but induction proceeds by gradual evolution.

The principle of uniformity.

The principle involved in factor selection may be glimpsed in the paradigm of generalization from actual particulars. We will call it the uniformity principle, understanding by this term a broad, loose reference to repetitiveness of appearances, coherence, continuity, symmetry, simplicity.

Consider for example generalization from **I**. The general alternative (**A**) is more likely then the contingent one (**I**)(**O**), *because the former involves no unjustified presumption of variety in polarity like the latter*. We are not so much inventing information, as refraining from baseless innovation and maintaining continuity.

Thus, the qualitative inertia of the first factor is more significant than the quantitative change (from some to all) it introduces. In contrast, the second factor introduces just as much quantitative change (through the **O**), so that it is no better in that respect; and additionally, to its detriment, a novel fragmentation of the extension, absent in the original data and the preferred factor.

We obviously select the factor most resembling the given data, as its most likely outcome. Unless or until we have reason to believe otherwise, we assume the given information to be reproduced as far as it will go. We can thus express the principle that, in factor selection, the most uniform factor is to be accorded priority.

Ontologically, this signifies the assumption of maximum uniformity in the world, in preference to an expectation of diversity. Events are believed representative, rather than unique. The world seems to tend in the direction of economy.

On a pragmatic level, the reason for it is that a generality is easier to test than a particular statement, since deductive logic, through which the consequences of assumptions are inferred, requires general statements. Thus, the preference for uniformity also has an epistemological basis. In the long run, it assures us of consistency.

The uniformity principle, then, is a philosophical insight and posture, which sets an order of priority among the factors of a formula.

But, it is important to stress that this principle is merely a utilitarian guideline to factor selection, it does not in this format have the binding force or precision found in the laws of deductive logic. Inductive logic merely tries to foresee the different situations which may arise in the pursuit of knowledge, and to suggest seemingly reasonable decisions one might make.

Choices other than those proposed remain conceivable, and might be intuitively preferred in specific cases. There is an artistic side to induction, to be sure. Our general recommendations, however, have the advantage of having been thought out in an ivory tower, and of forming a systematic whole.