

Theoretical Anatomy

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The following is the beginning of a series of lesson plans on Theoretical Anatomy. The goal of this is just to show the potential for this topic.

The goal of the theory is to figure out the structure and function of the internal parts of the body without actually cutting open the body. All we have as grounds to arrive at conclusions are observations about ourselves and others. We can also conduct non-invasive experiments. The goal, just like with any theory, is to figure out the unobservable from the observable.

Some of the phenomena we can use to arrive at conclusions are:

1. Eating
2. Solid Excretion
3. Puking
4. Breathing
5. Speaking
6. Urinating
7. Beating Chest
8. Pulse
9. Bending of Body Parts
10. Hearing

There are many more such phenomena we will need in order to get close to a

complete theory of anatomy.

Assume you want to find out the internal structure and mechanisms of the human body. However, you are not allowed to actually cut open a human and find out. All you have is the ability to observe yourself and other humans, and conduct non-invasive experiments.

What we are essentially doing is constructing a theory of anatomy – figuring out what we cannot see on the basis of what we can. This is equivalent to Aristotle figuring out that the Earth is spherical without actually going outside the Earth or Kepler concluding that the Earth revolves around the sun. It is also the same as Dalton inferring the existence of atoms without seeing them based on how certain substances interact with each other, or Darwin postulating the common ancestry of species without actually seeing newer species emerge from older species.

In order to start this process, we identify phenomena of objects/processes which interact with the internal body. The obvious one to start with is eating. Let us state the following observation generalizations:

OG-1: Every human being takes in certain objects through a particular orifice located on the face (Let's call this orifice 'mouth' from now on).

OG-2: The amount a human can take in is more than the amount which can be stored in the mouth at one time.

OG-3: At one sitting, a human can only take in a certain quantity of these objects.

We can explain OG-1 and OG-2 by stating the following law:

L1: Objects enter through the mouth and then go into the body. They do not remain in the mouth.

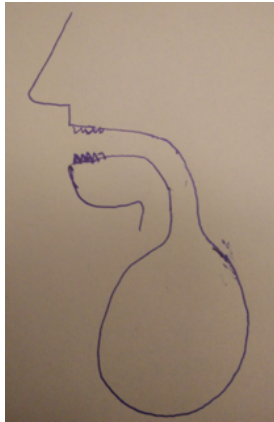
We can explain OG-3 by the following law:

L2: There is a sac inside the body where food collects. When the sac gets full, a human cannot eat any more.

One prediction of L2 is:

P1: If a human eats too much at one go, the food exits the body. This is upheld by the following observational generalisations:

OG-4: If you eat too much, and then some more, the food often exits through the same orifice it enters from. This phenomenon is called puking.



However, there is a deficiency in the sac argument. Consider:

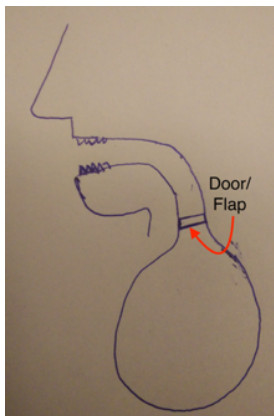
OG-5: When a human stands on their head with their mouth open after taking in objects through the mouth, they do not fall out.

Let's attempt to explain that with the following law:

L3: There is a door at the beginning of the sac which closes when humans are not eating.

An alternative to this law is:

L3': There is a flap at the beginning of the sac which allows objects into the sac but not out of it.



At this point, we don't have the required evidence/arguments to choose between these two possibilities.

One problem with the sac theory is that we eat every day. So, if the sac gets full, it would need to empty out before the next meal. One possible explanation lies in a phenomenon we have already seen, puking. Let's state the observational generalisation and the law:

OG-6: Humans tend to eat every day

L4: Humans puke out whatever they take in before they eat next

The implication of L4 is:

P2: Humans puke on a daily basis

This Prediction is not true. In fact, puking is quite rare amongst human, and certainly not a daily affair. So, L4 can be dropped as a law.

Let's bring in another phenomenon, solid excretion through the orifice contained between the buttocks. Notice that though the correlation is not linear, when we eat more, we excrete more (keeping everything else equal – factoring out variables like stomach upset)

OG-7: When humans eat more, they excrete more

We need to explain this. One possible explanation, which will explain both OG-6 and OG-7 within the theory so far are:

L5: Humans excrete out everything they eat

The implication of this is:

P3 - The weight of the excretion should equal the weight of what is eaten

This does not match what we observe. So, L5 is wrong. However, we cannot abandon it completely since we still need to explain OG-7. So, let's replace it with:

L5': Humans excrete out some of what they eat

This new formulation requires us now to explain what happens to the rest of what humans eat.

OG-8: When humans exercise a lot, they feel more hungry

This seems to imply that some of the food gets 'used up' in exercise

L6: Some food gets used up while exercising

Another observation is:

OG-9: When humans eat a lot for a significant span of time without exercising, their weight increases

L7: Some food adds to the weight of the human body.