

# DYNAMIC MORPHOLOGY AND EMBRYOLOGY

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The aims of this chapter are:

First to give additional examples of dynamic morphology in order to familiarize the reader further with this way of working and perceiving, building upon the phenomenological approach as presented in an earlier chapter, where it was termed *dynamic perception*;  
Second to give the reader an experience of the kinds of insights which can be gained by looking for polarity in human and natural phenomena, taking the *participant's stance*;  
Third, to demonstrate that this scientific approach, in contrast to the conventional approach of natural science, leads to the conclusion that nonmaterial i.e. supersensory principles are at work in the physical world. It enables us to come to this conclusion on the basis of observations of material phenomena, perceived by the ordinary senses.

Since this training manual is primarily intended for medical practitioners, the examples chosen are mainly taken from human biology. In later chapters this method will also be applied to other areas of biology. The methodology and fundamental stance demonstrated in this chapter can be given a broader practical application in physiology, psychology and pathology.

## Steps and method

We will start with a brief introduction concerning the methodology of the dynamic approach and the way the concept of polarities is used in this context (Section 4.1).

In Section 4.2 the previously described approach will be applied to the realm of human conception. Brief interludes will refer back to points made in Chapter 3 regarding scientific principles. By means of these examples the essence of the concept of polarities will be elaborated.

Section 4.3 of this chapter will deal with the human skeleton and posture, following the same dynamic approach. We will also elaborate on a central concept of the anthroposophical vision of the human being, namely the middle.

Using examples of the dynamic morphology of the human embryo, fundamental principles of anthroposophy will be demonstrated again in Section 4.4.

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<sup>1</sup> The author likes to express his gratitude to Mrs. Kristina Kossack from Pottville NSW Australia for her accurate and helpful assistance in order to re-edit the article from its original version

## 4.1 A minifying glass as a tool for observation

*We must use the darkness  
to make light visible.*

J.W. Goethe <sup>2</sup>

Goethe always stressed in his scientific work how one must 'look at things in context.' This applies especially for polarities. After all, we can only recognize them whilst looking at the whole within which they appear (see quotation above).

In Section 3.1.1, where different sets of teeth were discussed, it was shown that much can be learned by observing each detail separately. There it was termed the *analytical approach*. The *comparative approach* then takes the isolated elements and places them in connection with and in relationship to one another, thus creating an overview. Seeing a 'broader' coherence opens up possibilities of seeing more of the essence of the separate parts, and discovering phenomena which remain hidden whilst only focusing on isolated parts. In other words, one develops an eye for the total picture, the entirety so to speak, which encompasses all the possible variants. Three steps were described in Chapter 3, the third of which was seeing dynamics which lead to the final form-composition of the total picture. This dynamic approach adds a significant dimension: we begin to experience sculpturing gestures in what we observe. By penetrating to the level of the gestures, which gave rise to the outer form, we enter via the phenomena into the so-called supersensory realm which is present behind (or beyond) those phenomena.

To elucidate the method applied here, let us now turn to the following example. Let us ask ourselves the following question, 'Why do we see the head as round and experience it as a sphere?' We all experience the head that way, yet on closer scrutiny, this cannot stand up to scientific analysis. The anatomical and analytical mind of modern natural science cannot perceive the head as round anymore. In medical school, students become acquainted with scores of protrusions, crests, ridges, and angular edges on the skull and they learn to name all of these. No 'roundness' can become visible with such an approach. On the contrary, the more one focuses on the human skull, going into ever more detailed descriptions, the more one loses the naive perception of the head as round and sphere-shaped. The question posed above, 'Why do we see the head as round?' was intended to bring us to the following dilemma: Which of the two perceptions is more realistic or true, the naive assumption of roundness or the analytical anatomical observations?

Many people will solve the 'dilemma' outlined above by accepting the naive perception as correct in a general, global or holistic sense (with a wink so to speak). We can call this perception 'more or less correct,' and point to children's drawings to indicate and declare that they always, and strikingly, present the head as round. With such an argument, we can depict the perception of the head as round as literally naive. But Goethe would have rejected any suggestion to therefore apply a simplistic 'global' approach. His own observations were painstakingly precise, and his descriptions never shy away from details. On the contrary, in his scientific works he goes into minute phenomenological descriptions to document and underpin a gesture, which he saw expressed in certain organic forms, be it of individual organs or of whole organisms.

In the spirit of a Goetheanistic approach, an answer to the 'dilemma' posed above, could sound more or less as follows: By fixing one's gaze solely on the head or skull (to concentrate on it so to speak), one will fail to see the roundness. The skull and the head belong within the context of the human skeleton and the human body respectively. Our starting point with the approach propagated here are the entities as they occur in nature.

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<sup>2</sup> From J.W. von Goethe, *Theory of Colour*

Head and skull are analytical entities, parts of a unity or a whole, produced by reductionistic thinking and by isolating them from the whole of the skeleton or body concerned. If we start with the human skeleton or body as a whole and let our gaze wander from the head to the arms, back again to the head and then to the legs, back and forth, in short, if we regard the head in its polarity to the extremities, we will recognize from the extremities how round the head or the skull really are and at the same time realize how straight and radial the limbs and their tubular bones are; a perception which in its turn can never be experienced and observed whilst looking at the single elements of the bones of the extremities in isolation.

It will be obvious that dynamic perception, as described in Chapter 3, applies here better as well. The 'mobility' of perception should perhaps be taken even more literally here than in Section 3.1.3 (the dynamic approach). To be looking within a certain context, comparing and going back and forth, is meant here in contrast to the kind of gaze that fixates itself, concentrates itself so to speak. No matter how much we study the bones of the extremities, we will never get to the concept of 'straightness' whilst looking at them in isolation. Yet straightness is an essential characteristic of the extremities if we compare them with the head or skull. We will see ever more knobs, ridges, and convexities whilst looking with an analytical eye at the bones of the extremities, and only the comparative approach will reveal the characteristic of straightness of an arm or a leg. The two approaches form a contrast. In the one case one approaches the object using a magnifying glass, which will reveal more and more detail. In the other case one takes a step back and looks at the detail in the context of the whole to which it belongs. This kind of contemplation permits us to view the entirety thus following the advice which the Dutch anatomist Louis Bolk once gave, which was to 'look at life through a minifying glass.' To see the head as round is not the product of looking in a general or naive way; it is the result of clear, exact, but at the same time dynamic and agile observation.

In such an approach details are not distracting or redundant. On the contrary, they are an essential prerequisite. Once the polarity straight-round (radius versus sphere) has been discerned in extremities-head, one can then go on to look, in a Goethean phenomenological manner for other phenomena to support the polarity observed. The gesture which has initially been discovered (inductively, if you will) can then be underpinned (deductively) by other observed details. Thus an important outcome of the choice of looking dynamically, and taking the participant's stance, emerges. *It becomes apparent that the analytical approach which results in isolated perceptions can be included within the comparative / dynamic approach, but the other way around this does not apply. An analytical approach with its resultant perceptions principally excludes perceptions gained in a dynamic approach.*

Consequently the concept of polarities will become an important key to a dynamic morphology, understood as the morphology of gestures. After all, once one is capable of discerning polarities, one has already 'risen' to a new level of perception. If one stays within the narrow framework of reductionistic thinking, only looking at things in isolation, polarity cannot reveal itself. For it to be recognized, one must leave the level of fixing one's gaze on details, and make room for agility and comparison. Moreover it must be emphasized that the term morphology was chosen here for a special purpose. The term anatomy is reserved in this framework to denote the analytical approach, which leads to the recognition of structures, and because the dynamic morphological approach indicated here can lead to insight into the dynamics of development of form. Thus one could say that the head is round (sphere-shaped) in a morphological sense yet not so in an anatomical sense.

*We have gotten used to tracing life through magnifying lenses in order to perceive matter which would otherwise remain invisible to us. How different, how much broader would our concept of life become if it were given to us to look at life through minifying lenses. Then we could survey all that would otherwise remain hidden from the naked eye, and rather*

*than recognizing material connections, as we do now, the interconnectedness of phenomena would become the object of our studies.*

Louis Bolk<sup>3</sup>

## 4.2 From two to one — polarities in conception

We have chosen human conception as the first area in which to practice discerning polarities. A close study of the phenomena of the egg cell and the sperm cell will give us the opportunity to practice comparative and dynamic perception; the participant's stance will bring so-called formative gestures to light. This example will also reveal more about the nature of polarities in a Goetheanistic sense. Rather than being opposites, we will see how the one is similar to the other, but 'turned inside out'; such an observation points to the fact of a shared essence being present beyond the polarities under consideration. Oppositions separate into two (duality) so to speak where polarities tend to complement each other and therefore 'connect' and to be one (entity). This will be elaborated in Section 4.3.

### 4.2.1 Polarity and contrast

Emphasizing the differences between egg cell and sperm cell is no longer customary, undesirable even, in current scientific thinking. It has become common practice to reduce living nature to the same building units (think for example of cells, DNA, molecules). Rupert Sheldrake calls this practice, somewhat derogatorily, the attitude of '*nothing butterism*.'<sup>4</sup> This appears in remarks like, 'traits of an organism are based on '*nothing but*' a nucleotide sequence on a DNA molecule'. Current descriptions of fertilization speak of two reproductive cells which must merge in order to pass on their hereditary material to the subsequent conceptus. The two cells derive their significance primarily from being carriers of DNA. This then is what it's all about. The morphology of the two cells thus seems to be of little significance. This appears to be confirmed by the many modern techniques of manipulating them, accomplishing the seeming 'goal' of conception: bringing together two units of DNA.

Now let us approach the same issue in the manner Goethe and Bolk would have used, taking the phenomena for what they are and looking at the human sperm cell and egg cell in the context in which they appear. On the one hand there is the context of anatomy and physiology of the two sex cells themselves and the corresponding sexual organs. On the other hand there is the context of the *pre-conceptual attraction complex*. The latter term refers to the biological complex which is formed, under normal circumstances, by both gametes together; it lasts a certain period of time before the actual merging of the two cells (i.e. the so-called penetration by a sperm cell) can take place.\*

It is only through a comparative approach that one can come to the conclusion that the egg cell is very large and the sperm cell is very small, actually they are 'as large as possible and as small as possible'. A quantitative description on a sliding scale of numbers and measurements - diameter of a regular cell about 10  $\mu\text{m}$  (= 10 micrometer – 0,010 mm) head of the spermatozoon: 2–3  $\mu\text{m}$ ; egg cell diameter: about 200  $\mu\text{m}$  - cannot express the qualitative difference between large and small. A dynamic approach to egg cell and sperm cell adds an extra dimension here. If one takes into consideration how large and how small both cells actually are and especially how they come to be large or small (i.e. to be large and small as a gesture, as 'behavior'), an enormous polarity is revealed right away. Measured in terms of human biology, the egg cell is already gigantic. With a diameter of 0.2 mm and a

<sup>3</sup> Bolk, L. *Hersenen en Cultuur*, 1917, p. 25 [*Brains and Culture p.25*] (Dutch. NT)

<sup>4</sup> R. Sheldrake, *A New Science of Life*

\* The question about the actual moment of conception is left open here. After considering the thoughts presented in the rest of this chapter, the prevailing assumption that conception takes place at the moment that the male and female pronuclei fuse might appear in quite a different light. It might need to be reconsidered altogether .

cytoplasm volume of 0.004 mg in weight, it is without a doubt the most voluminous ball of cytoplasm a human being can produce. Certainly, neurons can reach formidable lengths (up to many thousands of times the average cell size, which is about 10  $\mu\text{m}$ ), but in terms of volume the egg cell surpasses them all. This expresses itself in the dynamics of its manner of maturing. The egg cell matures in a process of both increase and preservation of its volume. It makes itself "as large as possible" as it were and accumulates so much cytoplasm during the process that it can hardly handle its body mass any longer and it requires the nurturing surroundings of the ovary to enable it to stay alive. The relatively large volume of cytoplasm which characterizes the original sex cell in the embryonic phase is at least maintained. During its first reduction division which the egg cell completes at the moment of ovulation, this impression of 'striving to preserve its volume of cytoplasm' is confirmed by the phenomenon that the primary oocyte separates into two sister cells, which are totally disproportionate in terms of volume. One of the 'cells' — the polar body — contains the requisite DNA substrate, the other one (the secondary oocyte) retains the cytoplasm. A second typically phenomenological argument to describe the egg cell as 'very large' we find in the fact that it is the only cell of the entire human body reaching a size large enough to be perceived by the naked eye. The whole realm of 'cellularity' is below the level of visibility; only the egg cell with its size of a grain of sand (approximately 0.2 mm) is visible. Being large as a quality, as behavior, as gesture. Viewed in an equal manner the sperm cell is 'as small as possible': almost everything related to cytoplasm and cell fluid is being expelled; only the nucleus and a few cell organelles (mitochondria in the neck area, fibrils in the tail) remain. Any sperm cell which cannot achieve this during the last stage of its maturation cannot function efficiently and is seriously handicapped in its movement for example.

### Assignment 1

Using the chart on the next page, try to find as many contrasts as possible between the sperm cell and the egg cell. See also the illustration of the two gametes (sex cells) below, if needed. Look not only for contrasts on the level of individual cells with their morphology and physiology, but try to look beyond that. Think for example of the different roles the two gametes play in the process of fertilization and also of the physiology and morphology of the two corresponding sexual organs (gonads).

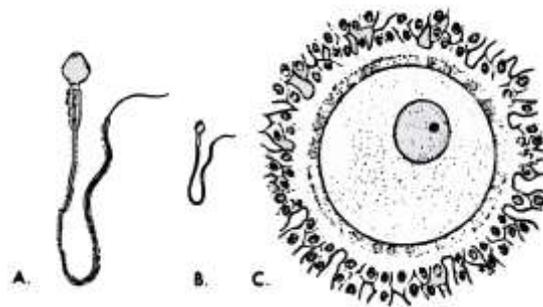


Figure 4.1

Sperm cell (A) and an unfertilized mature egg cell with corona radiata (C).  
In the center a sperm cell on the same scale as the egg cell (B).

### Methodological remark

The observations and facts presented so far are fairly straightforward and are still only relative, because they are not the result of looking at the egg cell and its size in isolation, but of viewing it in context whilst comparing it with the sperm cell. By a process of looking back and forth between them, indications like 'big,' 'volume retention,' and 'expand' acquire their profile.

As a polar opposite the sperm cell is marked by its 'smallness.' Let us begin with the quantitative part, which is relative. The diameter of the head of the spermatozoon is about 2 or 3  $\mu\text{m}$ , and the length from head to tail is about 60  $\mu\text{m}$ . Two  $\mu\text{m}$  may be quite a small size for a cell (a 'normal' cell is about 7  $\mu\text{m}$  in diameter), a tail of 60  $\mu\text{m}$  on the other hand is relatively very large. 'Smallness' becomes more significant, if one considers that the decrease in size of the eukaryote cell simply has a limit due to the amount of genetic material (DNA) that has to be retained for it still to remain a human cell. Seen in this light, the performance of this germ cell is a remarkable achievement. During the last phase of the spermatozoon genesis, such a large amount of cytoplasm is discharged and secreted that at the end of the germ cell maturation very little cytoplasm, and a relatively high amount of nucleus material, remains. Moreover, the latter becomes highly concentrated. The DNA is considerably dehydrated, so that an almost pure, highly structured form of DNA remains. The germ cell displays the characteristics of a cell entering into a so-called 'programmed cell death' phase (apoptosis). Consequently, the DNA becomes highly concentrated and the cell becomes pycnotic. On a submicroscopic level the DNA in the head of the germ cell makes an almost crystalline impression. This process of concentrating or shrinking (in contrast to the swelling and expanding of the egg cell) gives this germ cell as a whole the possibility to become so small, to behave as 'small' so to speak.

### **Methodological remark**

*The analytical approach gives us the measurements (i.e. 2  $\mu\text{m}$ , 60  $\mu\text{m}$ , 200  $\mu\text{m}$ ) and the intracellular relationships (the ratio of nucleus to cytoplasm). The comparative approach shows the strong contrasts playing here, also in the underlying processes which are part of the happening as a whole, such as the expelling of the polar body by the egg cell and the excreting of the cytoplasm by the sperm cell. The dynamic approach with the corresponding participant's stance facilitates us experiencing the process of becoming large or small. Thus by immersing ourselves into the formative process ("living it" so to speak) (see Section 3.2.2), we can identify with the gesture and the movement. By taking these three steps, we become less dependent on the bare material facts, which is a necessity! This allows us to reach the conclusion that the egg cell is characterized by the gesture of expansion and the sperm cell by the dynamics of shrinking or concentrating. Once we arrive at such a conclusion, the physical size of the tail of the sperm cell of 60  $\mu\text{m}$  (still quite large) becomes irrelevant.*

Considerations concerning simple things like 'large' and 'small,' as in the methodological remark made above, bring yet another essential fact about polarities to light. Before we elaborate on this, let us first return to the object we were observing. Once the egg cell has left the ovary and has completed its first reduction division or meiosis, it is metabolically active. One could say that it communicates and interacts with its surroundings. This entails physiological vulnerability. An egg cell is a vulnerable organism which should not be manipulated by too much physiological force. Consider how sensitive it is to chemical, osmotic, or temperature shock<sup>5</sup>. If we take the corona radiata into account as well — which we can do since we're contemplating the egg cell organism — we are dealing with a biological entity which is able to excrete substances and capable of influencing its immediate surroundings, be it in minute amounts only. Think of EPF, Early Pregnancy Factor, for example.

In contrast to this, the sperm cell seems oblivious to its surroundings. That is not to say that the sperm cell does not react to its surroundings — think for example of the way the sperm cell automatically 'swims against the tide' or how it reacts to chemotactic substances — but it does not metabolically communicate with its surroundings the way the egg cell does. Freezing spermatozoids (to temperatures as low as  $-60^{\circ}\text{C}$ ) does not seem to affect the life of

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<sup>5</sup> This still is true for mature egg cells. They cannot be frozen without damaging the vulnerable cytoplasm organization. Modern techniques involving rapid cooling down of egg cells are only applicable for the immature egg cell (pre-oocyte or primary oocyte).

these cells. Thawed months later, they merrily continue on their way. Thus we can think of and apply all kinds of manipulations to the sperm cell without obviously damaging it: we freeze it, we centrifuge it, we expose it to treatments with acids in certain procedures! This quality of remaining relatively unaffected by influences from outside (biological invulnerability) goes with the cellular structure of the sperm cell. Whereas one can perceive the egg cell as being a gigantic cytoplasm reservoir, the sperm cell is reduced to a highly structured nucleus package (DNA package) with a relative lack of vitality.

	EGG CELL	SPERM CELL
PARAMETER		
Size of the gamete	<i>large</i>	<i>small</i>
Shape of the gamete	<i>sphere</i>	<i>radius</i>
Motility	<i>can be moved</i>	<i>actively mobile</i>
Metabolic relationship to the environment	<i>'open'</i>	<i>'closed'</i>
Condition of the nucleus, in particular the DNA	<i>active, 'unrolled' DNA</i>	<i>condensed DNA</i>
Ratio nucleus to cytoplasm	<i>cytoplasm &gt; nucleus relatively a lot of cytoplasm</i>	<i>nucleus &gt; cytoplasm hardly any cytoplasmic content</i>
Number of gametes	<i>'many'</i>	<i>'one'</i>
Vitality and biological vulnerability	<i>vulnerable</i>	<i>invulnerable</i>
Age; lifespan	<i>'old', in first meiotic cell division since fetal phase</i>	<i>'young'; average lifespan max. two, three months</i>
Character (sequence) of the reduction division	<i>uneven (polar bodies)</i>	<i>equal</i>
Relationship to (body) temperature	<i>warmth, visceral</i>	<i>coldness, parietal</i>
Relationship to gonads & genitalia	<i>stored within the ovary tissue (follicles)</i>	<i>produced and transported to external tubes and ducts</i>

Which morphological concepts would be appropriate for this situation? To sum up the dynamics of the polarity described above, one could characterize the sperm cell as 'closed', and the egg cell as 'open' to its surroundings. If one really enters into the dynamics of this situation, one can bring them in line with the previously mentioned dynamics of large and small. After all, expanding and striving outwards goes with being open, whereas concentrating and 'centering' corresponds with being closed.

**Methodological remark**

*At this point we invite the reader to try finding even wider and more encompassing terms to characterize the gesture we have discovered. To point the way, we offer the concepts of the **centrifugal** (towards the periphery), and the **centripetal** (towards the centre) directions. One could also attempt to approach the phenomena by asking the following question: Which of the two gametes displays the dynamics of 'being fertile,' which one*

*those of 'fertilizing'? This may seem trivial from the perspective of the basic biological knowledge of today. But the point here is to try imagining the underlying gesture, to 'see' it as it were. Later on in this chapter we will return to the inevitable corollary of an approach such as this. Describing dynamics and gesture increasingly pushes the boundaries of language, as one continues progressing beyond the level of form to that of process. One starts off by describing characteristics of the two cells; from that basic level one proceeds to get to the formative process by thinking and describing more in terms of the typical forces that shape the egg cell or the sperm cell, and after that one penetrates to an even higher level (often indicated as the level of imagination). At that point one begins to need abstract words such as 'center' and 'periphery,' 'open' and 'closed,' whilst getting ever closer to the essence of the dynamics.*

#### 4.2.2 Polarities and turning inside out

The above phenomena could still be described in terms of contrasts. Yet it may have become obvious that more is at play here than contrasts in terms of oppositions, of repulsion and of inequality. In the case of the processes and dynamics of the egg cell and sperm cell discussed so far, there is an additional factor at stake. It was shown, for instance, that the egg cell with its dynamics of 'cytoplasm retention' carries out a highly symmetrical division in reproduction (the so-called meiosis) expelling a so-called polar body, whereas the sperm cell must expel nearly all its cytoplasm. If one looks at this in terms of the dynamic characteristics of egg cells or sperm cells, one can postulate that the egg cell casts off the sperm cell principle ('sperm-cellness') and that the sperm cell, in turn, expels the egg-cell principle ('egg-cellness').

##### ***Methodological remark: corroborative data from pathology***

Knowledge of the pathology often helps to gain better insight. If the sperm cell does not succeed in ridding itself of superfluous cytoplasm, it cannot function properly. It would be too heavy and hampered in its mobility by the bag of cytoplasm attached at the height of its neck. If one looks for polarities, pathology shows the following pattern: *What is appropriate and fitting for one pole and promotes its function, is detrimental for the other pole and makes it dysfunctional.*

One could describe the egg cell as a cell which has an inner space; there is content. The sperm cell has sacrificed its inner part; it has given its content away. In that (dynamic) sense the sperm cell has no 'inside.' The egg cell absorbs light (to which end it has its mass) but the sperm cell refracts light, a phenomenon directly observable under the microscope. In that sense it is appropriate for the separated polar body to be strongly light-refracting. Moreover, the polar body is no longer endowed with the optimal fertility which is so characteristic for its sister cell (the secondary oocyte). In human beings, it is highly questionable if a polar body would still be capable of human development. If such a thing occurred it would be quite rare and sporadic, in which case it would be quite an exceptional form of fraternal twinship. The polar body represents 'sperm-cellness' as it were and therefore it is the polarity of the remaining body of the primary oocyte which represents the 'egg cellness'-factor

Even more captivating is the phenomenon of *mobility*, which is intended here in a literal, physical sense. Indeed, one cannot fail to notice that the sperm cell is highly agile. Pathology shows that sperm cells which cannot swim will not function. The characteristic ability of sperm cells to swim against the tide and determine their direction that way is foreign to egg cells. An egg cell cannot move independently. It is being carried along by the flow of ovarian fluid. Again we see a contrast, but is this also a polarity? Up to now we observed outer movement, but what is happening on the inside? Almost total inactivity reigns inside the sperm cell, which is due to its structure (in the form of the DNA formula); here we hardly see any intracellular metabolic dynamics. The situation inside the egg cell displays quite the opposite. Plenty of cytoplasmatic dynamism of cell organelles and metabolic activity reign

there. It could be postulated that the sperm cell displays mobility on the outside, whereas this is internalized in the egg cell. In their interaction with their surroundings, the two cells are polar opposites. In their manner we can see a parallel with the 'open' vs. 'closed' gestures pointed out above. Whereas the sperm cell relates to its surroundings by pushing *against* them, the egg cell communicates with and is open to its surroundings; it moves *along* with them. Moreover: we tend to call the egg cell a 'passive' principle because, so it is said, "She cannot move". Of course an egg cell can move, but in a completely polar way compared with the sperm cell: she lets herself be moved by the flow of liquid in the fallopian tube. Being moved is regarded here as an 'inner' activity, mobility as an outer or outwardly oriented activity.

The latter brings us to the phenomenon of *turning inside out*. More accurate consideration reveals that the observed contrast is at heart a commonality. This can easily be illustrated in biological terms for the spermatozoon and the ovum. Both cells are derived from primordial sex cells which at the cellular level in a six-week old human embryo have the same size and shape, even though they each contain a different genome (either XY or XX). After this commonality at the beginning, both the spermatozoon and the ovum become one-sided and go their own separate opposite ways. *Seen in terms of morphological dynamics, one could postulate that the sperm cell specializes in 'nucleus,' and the egg cell in 'cytoplasm.'* This is in accordance with the biological principle of a spermatozoon, just like the polar body, being incapable of producing the substrate for a cell (the zygote, i.e. an organism). An ovum does have that capability (in principle), as can be seen, for example, in the phenomenon of parthenogenesis (not possible in humans).

### **Methodological remarks**

*These observations indicate a clear difference between this approach and the current reductionistic, dissecting method. Most of today's biologists would consider it undesirable proceeding in this direction, even finding the territory we have entered 'out of bounds.' To call a germ cell a 'nucleus head,' or to designate an egg cell as a 'ball of cytoplasm,' is only justifiable within the framework of the phenomenological approach practiced here. It could be argued that the sperm cell also contains cytoplasm (even if it is not much), or that the egg cell also has a nucleus, and that they both have the characteristics of a proper cell. So be it. But if one remains on the level of details, one will never discover the possibilities of this approach. Staying within one basic paradigm, these observations are indeed not 'true.' The dynamics of the germ cell as a 'nucleus' and the egg cell as 'cytoplasm' simply do not reveal themselves within that framework.*

*Calling this a break with convention is justified, because of the analytical approach excludes insights which can be gained by the dynamic approach. The reverse, however, is not the case. These remarks run along the same line as the conclusions we reached when talking about 'seeing the roundness of the head' at the beginning of this chapter. This strongly underpins the postulate that facts are not impartial, but that a perceptual content is always intertwined with interpretation.*

The following considerations supply further support to show that we're dealing with gestures of **polarity** between 'nucleus' and 'cytoplasm.' Of course the egg cell has a nucleus, but it is embedded in a completely different process from that of the sperm cell. The DNA in the egg cell is metabolically active; it is 'unrolled' as far as is necessary and involved in well-known processes of transcription, translation, etc. One can postulate that the egg cell depicts the processes of a cell in *interphase*, the cell is *extrovert* to its environment so to speak, whereas the sperm cell is *introvert*: the whole cytoplasmatic activity is literally concentrated to the process of DNA-replication. By contrast, the biological dynamics of the sperm cell have the signature of a cell in the *mitotic phase*. The DNA is well-ordered and structured, the nucleus is correspondingly pycnotic and metabolically inert. In the current analytical, 'magnifier' approach the sperm cell and egg cell each have a nucleus and cytoplasm; in the comparative, 'minifier' approach a sperm cell is 'nucleus' and an egg cell is 'cytoplasm'.

Viewed in this way, an interphase bears the signature of cytoplasm and could thus be characterized as peripheral, centrifugal, and open. In other words, it is like the egg cell. The mitosis bears the signature of the nucleus and could therefore be characterized as central, centripetal, and closed; in short, it is like the sperm cell. In that sense it could be postulated that the cell divisions constantly taking place in a living human being (every second, day in day out, all through life), could be viewed as a breathing process. There would be a large rhythmical alternation of cells closing themselves off from their surroundings and turning towards the replication of the 'inner' ('sperm cell gesture') and cells opening towards their periphery ('egg cell gesture') and so on.

### **Methodological remark**

*Recognizing such a gesture in the process of cell division obviously requires a rather high degree of 'dynamic perception.' But imagine where this can take you. It enables you to gain a first glimpse at cells in a larger breathing process. First, they open themselves to influences from their surroundings (periphery). Then, they turn to concentrate on reproduction, so that they can imprint those influences from their surroundings into the inside of the cell (the process of cell specialization and differentiation). The dynamics of the two gametes involved in conception resound like a first chord in a symphony. The first manifestation of the living organism!*

### **4.2.3 Preliminary conclusion — polarity and unity**

One can look at ovum and spermatozoon as one-sided, polar developments from one many-sided, common origin. By forming a concrete image of the original sex cell it is even possible to picture the original unity out of which the two gametes polarized. Building the image up in thought, one can transform the one into the other, that is to say, the polarity exists in fact within a unity.

'Egg-cellness' can manifest because 'sperm-cellness' is cast off, and the other way around! Going a step further, we could maintain that they owe their existence to one another. They belong together. Understood in this sense, it is no wonder that sperm cell and egg cell meet. They complete each other, they fulfill each other so to speak! How that comes about (by means of the preconceptional attraction complex), will be contemplated later on. In the dynamics of cell division with its alternating mitosis and interphase we can recognize a rhythmical 'repetition' of the gestures of the ovum and the spermatozoon, which indicates that we are beginning to gain insight into a higher level which is at work in the formative gesture of the particular egg cell and sperm cell.

### **4.2.4 More polarities in conception**

Why can we perceive the sperm cell as 'straight? Thinking back to the corresponding question we asked with respect to the naive assumption of the head being round, this question is relevant. For that winding 'creature' is straight of course in having the appearance of a radius. The spermatozoon is a radius with a beginning and an end; the ovum is a sphere. The anatomical facts confirm this: there is hardly a more spherical cell. And spherical cells are the exception. Maybe this is so because cells are normally never found by themselves, but they always form some kind of tissue together with many others. The ovum is a solitary cell. Egg cell tissue does not exist. The sphere is a self-contained body, it has no beginning and no end.

### **Assignment 2**

*Imitating the perceived gesture by acting it out and thus experiencing it physically can often be of great help. You can 'play' a spermatozoon by standing upright and*

*stretching upwards as far as you can, and experiencing how that feels. After that you can withdraw into yourself and curl up into a ball, thus getting a sense of that condition. Apart from sensing the sphere and the radius, there's also an experience of dark and light. The sphere can be felt as a self-contained form. The sphere has no direction, no beginning and no end.*

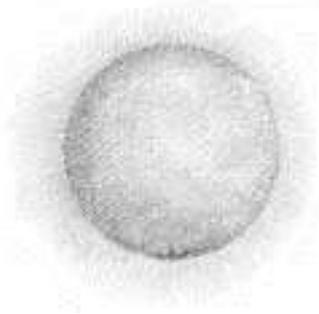


Figure 4.2 Preconceptional attraction complex

Drawing from Appenzeller, *Genesis im Lichte der Embryologie* (*Genesis in the Light of Embryology*)

The analytical eye might experience some difficulty seeing the radius character of the sperm cell, but for comparative and dynamic perception it is as clear as daylight. Moreover, it is an impressive happening to witness the process of turning inside out. In a geometrical sense, there is a myriad of radii within the sphere of the egg cell, which however are not manifested in a physical form. The sperm cell manifests as a radius. In that sense the two cells are polar opposites again, and at the same time the one is the other one turned inside out. The egg cell displays what the sperm cell conceals, and the other way around. How can we interpret the entirety of the preconceptional attraction complex? In Figure 4.2 we see the unity composed by hundreds of sperm cells arranged around the solitary egg cell, which lasts for many hours before the so-called act of cell fusion can take place. Do the sperm cells not make visible what the egg cell carries invisibly within? Sperm cells literally radiate that invisible dimension back to the egg cell. And do the sperm cells not form one large sphere, consisting of rays?

### **Assignment 3**

*Dynamical form drawing can also enhance one's own experience whilst trying to recognize gestures. Draw a circle with a pencil, do it in a large format and keep repeating the circular motion for quite some time. Accelerate the movement and then slow down. Take notice of how you feel, pay attention to your state of consciousness. In drawing this kind of 'perfect' circle, which you're quite likely to succeed in, you will find the centre of the circle becoming visible without you actually drawing it. After all, everything revolves around that centre. Is the circle not a collection of dots equidistant (radius) from a chosen centre? And that centre is an 'invisible' point. Now take a new piece of paper, concentrate on the central point and try approaching it from every direction, swooping down on the paper, landing, going through that chosen center, and then lifting off from the paper in the same movement. Try this several times and once again take notice of how you feel, paying attention to mood, state of consciousness and inner experience. Is it not quite different? How easy or how difficult is it this time to exactly draw a point? This time the radii make a sphere visible as well, which again 'is not actually present'. Can you sense how these are two ways of determining a center? Try to experience how these are literally two 'approaches,' substantiating the point of the turning inside out of sphere and radius.*

We will continue to discover even more polarity. For conception in the normal definition of the word (the fusion of two pronuclei), one sperm cell and one egg cell would suffice. By looking at what actually happens, however, we can see how during the period of the preconceptional attraction complex hundreds, even thousands of spermatozoa need to be present. With fewer it does not work. The numbers supplied by fertilization physiology confirm this. If a man is not able to produce 20 to 40 million spermatozoa per ejaculation, he is physiologically infertile. Tens of millions of sperm cells are produced every single day! That means hundreds of them per second! Contrary to this, out of every 10 to 20 primary oocytes which commence the final stage of maturation prior to ovulation, the majority will perish. One ovum will be released, at most two. In contrast to the situation in the male testes no further production of egg cells takes place in the female ovary. That had ceased several months before the woman was born. In the ovary we only encounter a great reduction and deterioration!

Let us now consider the concepts *one* and *many*, or a lot. Do they form a polarity? Here the same principle applies as in the case of 'small' and 'large.' In ordinary thinking, these words are used denoting quantities or measurements; in the series 1, 2, 3, 4 ... and upwards, we progress from number 1 to *many*, i.e. a large number. But there is another way of contemplating this. *One* is also a dimension, a quality. During The Middle Ages, people regarded *one* as the largest number. Something (or somebody) of which (whom) there is only one, is a great deal. *One* human being is not much in terms of physical matter, but very much when considered as a unique entity. One could maintain that a unique entity 'fills the cosmos.' In contrast to this, one can think of the cosmos as being filled with countless material Milky Ways, galaxies, stars and planets, usually experienced as *many*. Seen this way, *one* and *many* are polar opposites. The one form of *many* is material, in the sense of a lot of physical presence. That could be viewed as *many* in the way of the spermatozoa. Over against that there is the other *many*, or rather much: the immaterial vastness of something unique. That could be viewed as *many* in the way of the egg cell (ovum). As qualities, *one* and *many* are poles, where the one is the other one turned inside out.

### **Methodological remark**

*Perceptive readers will have noticed that there is more that distinguishes the polarity of egg cell and sperm cell - or rather 'egg-cellness' and 'sperm-cellness' - more than the mere contrast. We have already pointed to the principle of turning inside out; this is not a simple matter of + and -, but rather one of +/- and -/+. One also has to keep distinguishing on which level one makes the comparison, and within which parameters. Thus, when focusing on the metabolic, we spoke of an 'open' egg cell and a 'closed' sperm cell dynamics of the cell. But if one uses the concepts 'open' and 'closed' to express formative dynamics, then things are reversed. At the level of form (sphere-radius), the egg cell is the one that is 'closed,' and the sperm cell is the one that is 'open.' This methodological remark aims at pointing out once more that one is dealing here with a higher 'Gestalt-level' where polarity manifests.*

To come to a close, we now turn our gaze to the dynamics of 'sperm-cellness' and 'egg-cellness,' but this time at the level of the gonads. Directions and qualities of the gestures are again reversed here. The dynamics of the ovaries versus those of the testes portray a kind of 'counter image.' Whereas the sperm cell as a cell has the gesture of concentration and the egg cell one of expansion, the testes and the ovaries show us the reverse in dynamics. The testis is an organ which bursts with bubbling vitality, displaying an enormous mitotic activity. The sperm cells are also relatively 'young.' They will exist for 65–70 days at most, after which they are reabsorbed. Much calmer dynamics prevail in the ovaries. We cannot speak of productivity here. The ovaries preserve and protect. Already during the fetal life of the woman, egg cells lose their mitotic capacity and from that moment on (the sixth fetal month) the number steadily decreases. This gesture is rather centripetal, one of a gradual 'decrease' until the number of egg cells is reduced to zero at reaching menopause. The bubbling, exploding, centrifugal, sensitive to radiation dynamics of the testes are a contrast to the

quiet, imploding, centripetal dynamics of the ovaries. Macroscopically, the testis is a hard, shielded organ; microscopically we see a vast surface opening up to the outside. With 200 meters of so-called seminiferous and efferent ducts plus 12 meters of epididymis, the testis is all surface and openness. The ovaries are tender, but massive; the egg cells are embedded in them, and hard shielding off is pathological here (Stein-Leventhal syndrome).

### **Methodological remark**

*It will have become obvious by now that it becomes more and more difficult to find concepts and terms for the gestures one begins to track. More and more concepts are needed in order to express the dynamics manifesting here. Those concepts are not synonymous, each capturing a different facet of the gestures. Take for example the sequence mentioned above: centrifugal/centripetal — open/closed — periphery/centre — radius/sphere — light/dark — exploding/imploding. The researcher can get the somewhat unpleasant feeling of using a plethora of concepts while hardly, if at all, being able to name the central concept or the all-encompassing gesture. At that point it feels as if one loses the firm ground of clear facts and concepts under one's feet. Yet at the same time one can begin to gain a definite sense of the concept (see the consideration below). The orthodox materialist might feel at this point that things are getting too nebulous, but for the phenomenological approach this experience indicates that one is penetrating to the heart of the matter. The essence cannot be captured in words, but is nevertheless palpable.*

*Metaphorically speaking, the researcher is 'treading water' in the world of concepts. Yet a form of certainty can be found as one keeps progressing. The fact that we need to 'tread water' now can be regarded as inherent to the level we have reached. We're no longer concerned here with shape, or with process, but with 'Gestalt', gesture. Along this way one reaches the world of formative forces, which are at work behind every shape which has come to visible manifestation. Spiritual science calls this the etheric world. This level can only be perceived in pictorial form, using imaginative consciousness. This exercise of 'treading water' is a prelude to this level of imagination.*

### **Considerations regarding 'Sensing' and 'Seeing'**

*Blaise Pascal made a distinction between the esprit de géométrie and the esprit de finesse (the spirit of geometry and the spirit of finesse<sup>\*</sup>). The esprit de géométrie is needed for visual discernment. In the natural sciences, the esprit de géométrie is the basis of every method. Its main feature is communicability. ... It can be made clear to anybody that a papillionaceous flower has an undivided corolla, 10 stamens, one pistil etc ... But that flowers are 'passions of the earth,' as Goethe calls them, can only be communicated to someone who already 'sees' it.*

J.H. van den Berg<sup>6</sup>

### **Assignment 4**

*From Sphere to Radius - Exercise in Transformative Thinking. We have been working with the polarity of radius and sphere (straight and round). Were not those the dynamics of head versus extremities? The extremities can be seen as radii made manifest. Yet it is those very arms and legs which are able to describe a cone shape by spherical movement. Thereby the form is moved, placed in space; it becomes external movement. Is the head not spherical movement come to rest? If so, where are the radii? Are they the invisible dimension of the head, in the same way that the sphere or cone is the invisible dimension belonging to the extremities? And what is the movement which*

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\* The esprit de finesse refers to that part of reality which one 'sees' in a different manner, and which can be just as tangible as that which can be communicated. Pascal puts it like this, '*On les sent plutôt qu'on les voit*,' 'It can be more sensed than seen.'

<sup>6</sup> J.H. van den Berg, *Het menselijk lichaam*, Vol. 3 p. 100, Callenbach, Nijkerk, 1961 [The human body] (Dutch. T).

belongs to the head? Is that the external, spatial movement, such as arms and legs can perform, or is it more inward, nonmaterial?

Figure 4.3 is part of a 'meditative drawing' by Karl Heinz Flau.<sup>7</sup> The assignment is to come to an experience of the geometrical principles of point, curved and straight line, centre and periphery as 'mathematical language of gesture.' The task here is to try transforming one thing into another in thought, turning them inside out. One literally 'arrives at the other end.' Please note the process indicated by the word 'mixture' in the drawing. This concept will be elaborated on in the next chapter.

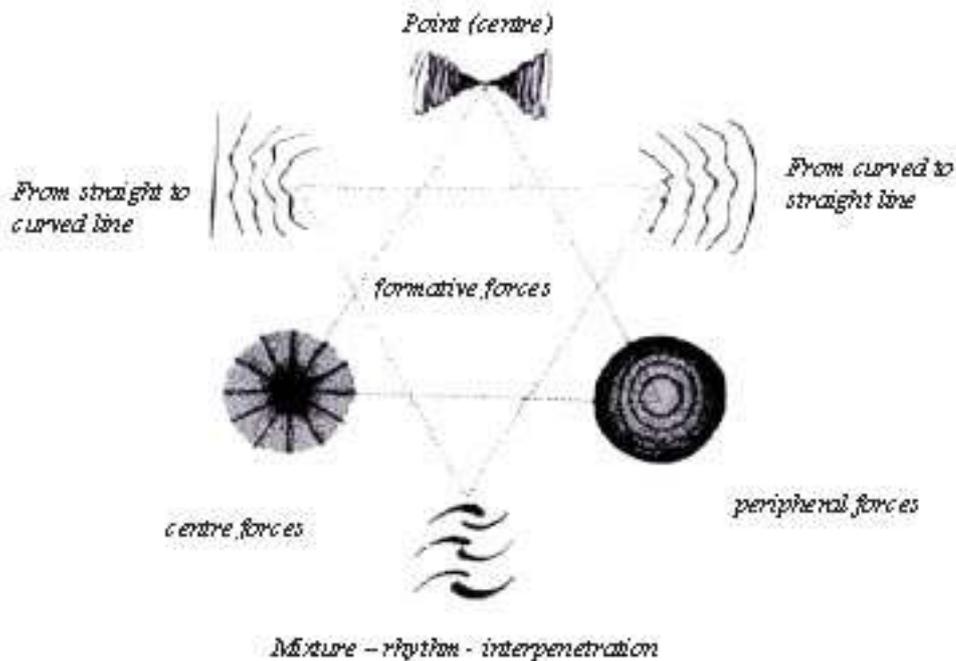


Figure 4.3

Point (Centre); From straight to curved line – From curved to straight line;  
Formative forces; Center forces – Peripheral forces;  
Mixture – Rhythm – Interpenetration

### Assignment 5

Drawing Exercise to Experience Transformation Turning 'Sperm-cellness' into 'Egg-cellness' (and vice versa). Take a piece of paper, and first mark three points which will form the ends of the three sides of an equilateral triangle. Do not draw straight sides, but let them curve slightly inwards. The idea is now to experience a force pushing inwards. Continue drawing the sides, whereby the force pushes them further inwards each time. The lines will curve inwards more and more, making the enclosed triangle smaller and smaller, more and more like a sperm cell. Once one has the feel of a rhythmical movement, moving through the line segment, coming to rest at the point (angle), moving through the next segment, coming to rest at the next point (angle), and so on from angle to angle. After a while the rhythm of going and stopping at a point, going and stopping at a point diminishes and one almost gets into a circular movement and one loses the feeling for the angular shape of the triangle.

<sup>7</sup> Karl-Heinz Flau, *Urbild und Wandlung* Ottersberg, 1980 [Archetype and Chance] (German. NT)

If one analyses the resulting drawing, one can see the still point, the transition where the form is turned inside out. After that, one comes out 'on the other side,' and another triangle slowly emerges, this time with the base upwards, and 'bulging out' on all sides. Is this not how a concentrating sperm cell movement is turned into an expanding egg cell movement?

In Figure 4.4, the series drawn by Karl Heinz Flau, note that he uses a totally different terminology, speaking of sucking and welling, and from the outside and from the inside.

**Addendum**

At the end of the drawing exercise, one could continue drawing the lines, taking them from the angles and extending them in thought. It will appear that it is thus possible to imagine the continuation of the lines into an infinite periphery.

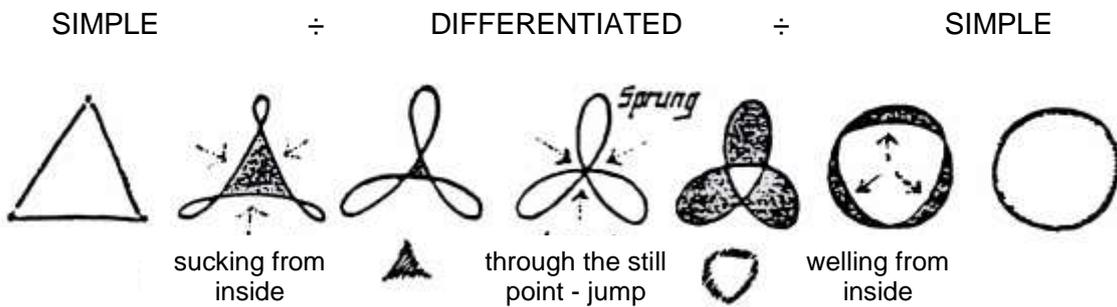


Figure 4.4

**Assignment 6**

Try finding characteristics of 'egg-cellness' and 'sperm-cellness' in individuals. This is best done by looking dynamically at pairs of individuals and comparing them. This is a good practice especially when one is considering children.

First concentrate on the way the chosen individuals are built, and consider posture and/or constitution. Keep a list of points of comparison between the two, and note down what you think the characteristic gestures are.

The next step could be to compare the found gestures with soul dynamics. What is inner, what is outer? For example, are there people who externally seem to be always on guard, hiding their inner feelings? And are there also people who are socially very accessible, but couple this with deeper psychological dynamics of reclusiveness?

It would be harder still to go on examining the relationship between 'soul dynamics' and outer appearance. One could ask the question, for example, whether a person who outwardly has an open attitude also has inner psychological and social openness. Do outward appearance and inner reality go together?

**4.3 One plus one makes three — the middle**

One conclusion we could draw from the preceding paragraphs is that polarities exist within a unity. Having seen that polarities are transformations of one another we can surmise that a higher principle connects or unites them. In this section we will begin to research the nature of this principle and see if it can be known. To that end we will first direct our attention to the human skeleton.

### 4.3.1 Polarities in the human skeleton

In chapter 3 we studied teeth, looking at the different elements, both on their own and comparatively. Our focus now will be on the totality of the human skeleton (and human bearing), within which we will look for polarities. The main one is between *head-skull* and *arms/legs-extremities*, so we are operating in the dimension of *centre-periphery*.

#### **Assignment 7**

*Once again, as in the case of the polarities between egg cell and sperm cell, it is a good thing to start with our own observations. On the checklist on the following page first note down polarities, using the approach we chose. Start from the principle of transformation, consistently thinking through to 'the other side'.*

As we know, the bones of the skull are a set of flat plates of bone tissue which can be regarded as the surface of a sphere, manifesting in bone. Together, these plates form a spherical container which holds the brain and is known as the neurocranium. One could comment on this by pointing at the viscerocranium. Such a comment, it could be postulated here, would be sparked off by an analytical approach, something which we will come back to later in this paragraph. The flatness of the skull bones and the spherical character of the skull as a whole will only come into perspective once we direct our attention to the bones of the extremities. For there we are dealing with long tubular bones. They do not form a sphere, but rather a long stretched out chain of skeletal elements.

The bones of the skull form close connections. The sutures are renowned for their tightness. Although, histologically speaking, we are dealing with connections built from ligaments (syndesmoses), they are extremely tight and hard to break due to their complicated jigsaw structure. In infants the connections can still be severed; in adults a skull will be more likely to rupture or break in case of trauma; the seam is unlikely to become disconnected. We could postulate that tightness and retention of form are the normal function here, whereas mobility would be pathological. With the bones of the extremities the situation is reversed. Here we are primarily dealing with *synovial connections*, which rather have the character of not being proper connections; for there is a space in between (we could therefore call them disconnections). This is functional because the joints need to be free to move. Tightness, characteristic for the physiology of the skull, would be pathological here. Concrecence within the connections would cause malfunctioning of the extremity.

In connection with this, a striking feature of the skull should be mentioned: it is an exoskeleton. Through the skin the bony skull can be almost directly examined *in vivo*. An individual's typical physiognomy is reflected in the bone structure of his/her skull. The bony elements of the extremities, on the other hand, are hidden from view. They are an endoskeleton, mainly covered by soft tissue, especially muscle. The presence of muscles in the extremities and the seeming absence of muscle in the head confirm this. The facial muscles are not intended to move the separate bones of the skull in relation to one another. The chewing muscles seem to be an exception, something which we will return to later on. A striking feature of the skull is that it is an exoskeleton; the soft parts (brain) are located on the inside. In the case of the extremities it is the other way round: the soft parts surround a hard center, they are on the *outside*. In our extremities the skeleton is being moved while in our skull the skeleton does not serve movement but connection and unity (being a vessel with content). Whereas the bony elements of the extremities are embedded in muscle tissue directly involved with movement, in the case of the head, movement is harmful for the soft contents. This is illustrated by the fact that the brain malfunctions (temporarily) in the case of a concussion.

	HEAD-SKULL	EXTREMITIES
PARAMETER		
Bone shape	Flat bones, planes	Cylindrical, radii
Nature of bone connections	Syndesmoses, tight junctions	Articular joints, rather disjoints
Mobility of the parts	Hardly any to none	Should be mobile in principle
Degree to which bones are recognizable in vivo	Exoskeleton	Endoskeleton
Relationship to temperature	Inside: skull coolness	Limbs represent warmth, high body temperature
Open or closed	Closed (as skull)	Open (radiating) parallelism
Internal vs. external mobility	Inside the skull (too much) mobility is pathological	Mobility should be present (immobility is pathology)
Vitality	Brain tissue is very a-vital, hardly any regeneration	Very vital
Blood flow	precarious	Abundant
Relationship to consciousness	(hyper)conscious patterns	(hypo)conscious reflexes
Relationship to outside world (periphery)	Antipathy	Sympathy

The head has an 'inside.' The skull encloses that, which goes with its spherical shape; the skull is *closed*, in contrast to the extremities, which 'radiate' outwards, have a beginning and an end, are able to move freely in their surroundings and are *open* in character. Here we once again encounter the polarities of sphere and radius. The pathology of (now rare) rickets gives us the picture of the reversal: the round head becomes *caput quadratum*, the straight extremities become bent.

The characteristic of the extremities is to diverge, split and fan out. If one follows the series of bones down the arm, one sees this pattern clearly: 1 humerus, 2 forearm bones (ulna and radius), 3 proximal carpals, 4 distal carpals, 5 metacarpals and corresponding phalanges. In order to characterize the dynamics expressed in skull and extremities, one could use the terms *concentration* vs. *divergence*. The extremity diverges outward towards the periphery, and 'opens' itself to it. Each in their own way, the extremities are turned towards the outside world, ready to adapt to it or change it by their actions. The extremity finds its centre 'out there.' By contrast, the head shuts itself off, concentrates, and finds its center 'here.' The extremities exist in space and develop gravity. The head encloses a space free from gravity, within which the brain is suspended in the cerebral spinal fluid.

### **Methodological remark**

*It is difficult to find the right terms for summing up the gesture which is at play here. Does the skull depict an image of detachment? Do the extremities make a gesture of grasping outwards towards the periphery? What is the relationship of the human being towards the environment and the world expressed in these two areas? Do we not reflect on the world in our head, whereas we act in the world with our limbs? Perhaps the words 'separate from' and 'connect with' would be fitting terms to express the two gestures. Or are gestural terms like antipathy and sympathy more appropriate? In this context it should be remembered that those terms are not meant as 'positive' and 'negative' of 'good' versus 'bad': Polarities are not plus or minus, they are both opposite qualities, they are extremes, one-sided so to speak, even pathological in a way (with equilibrium and harmony as the healthy 'in between').*

In this regard, we should further pursue the theme of mobility, and try to look at being active inwardly and outwardly. We found this equally helpful in order to understand the gesture inherent in the sperm cell and the egg cell. The extremities evidently move, they move in space and they are subject to gravity. In his extremities (limbs), the human being moves in a physical, material, sense perceptible way. In his physical body, the human being moves by means of his arms or legs. As indicated above, the head has a different relationship to movement. Outward, material, sense perceptible movement is reduced to a minimum here; it even hampers proper functioning of the brain and the senses. In order to observe accurately with eyes and ears, one holds the head still, otherwise perception is disturbed. This goes for other functions performed by the head as well. There is, however, a quiet mobility of a nonmaterial kind. If one observes the brain and the skull, one notices that they are strongly formed and shaped. In making that observation, we think not only of the fact that the skull is highly 'chiseled,' but also of the neurons, which lie in a strictly neuro-anatomical order. Even the movement of stimuli thought to take place along the neural passageways is only a semblance. In 'reality', spatial structures, which neurons are, depolarize. Whereas we move *with* matter in our extremities, in our head we **relate to** matter with a different movement. That type of mobility, characteristic of thoughts and imagination, is of a very high order. In fact, the mobility within our heads is much more subtle and ephemeral than any motor movements of our actions can ever be. We recognize this in common expressions — one can 'change one's mind,' ideas can 'come' or even 'hit' in a flash. Imagination has no bounds, and thoughts can move anywhere they want.

The extremities are radii which have become visible, and the head is likewise a sphere which has manifested in the visible world. The limb, however, is invisibly connected to the sphere. This emphasizes once more that the extremities are polar opposites of the head, because the mathematical center is located in the periphery, whereas the spherical head actually has its center within. The extremities have their center 'out yonder,' but the center of the head is 'here.'

### **Assignment 8**

*At this point it would be good to go over Figure 4.2 and Assignment 3 and either review Assignment 6 once again, or take it up anew.*

It may have become clear by now that the range of polarities which unfold between the head on the one side and the extremities on the other, is inexhaustible. This is no wonder, because they have to do with the nature of the way we relate to the world, which is indeed quite different for different areas of the body. The nature of cognition is in many ways the polar opposite of the nature of action (or volition). To be conscious and awake are two prerequisites of cognition, without which we are dealing with a pathological situation. In the sphere of action, the domain of volition, there is of course a certain degree of consciousness as well. However, if one wants to be fully conscious while one carries out an action, and be fully awake in every facet of the motion, one would actually hinder its fluidity. It is even so

that someone who fully masters a motion, say, of playing an instrument, will say, 'As soon as I stop and think about it, it goes wrong.' At a certain point, we have it 'in our fingers,' and no longer in our head. Experiences of this nature point to a certain degree of unconsciousness as being beneficial for uninterrupted motion and adequate action. We might well be dealing with a totally different relationship between body and spirit in these two spheres. There will be more to say about this in Section 4.3.6.

To round this off, let us make some observations concerning blood flow and temperature. A lack of blood supply is less precarious in the extremities than in the head. This is illustrated by the fact that it is possible to operate on an extremity for quite some time in a 'blood vacuum.' Cutting off large vessels in an extremity does not immediately lead to necrosis. The vascularisation of the head is quite a different matter. Blood supply to the different regions is regulated with great precision. Interruption, even if only for a few minutes, will soon lead to damage (necrosis). In that respect, the head is much more vulnerable than a limb. Apparently the buffers of vitality are greater there than in the head. Later in this chapter, we will return to this question of the connection of vitality with consciousness. With respect to body temperature, extremities differ from the head. The limbs function better with a temperature higher than the central core temperature of the trunk (37°–38°C) as it is in the trunk, the head tends to somewhat lower body temperature. If this is reversed, it is clearly unhealthy; 'keeping your head cool' is a well-known expression, and everybody is familiar with the fact that fever can lead to unclear thinking. A hot, feverish head is not the place for wakeful consciousness! But the extremities do not function well while cold. In physiotherapy, many applications are based on the wholesome effect of warmth on muscles and joints.

With these initial observations, we focused on the polarity of head and limbs. The aim of the chapter, however, was finding the way in which they form a unity. It will have become obvious that looking at head and extremities confronts us with the difficulties of the reducing, 'minifying' lens, that is to say that we need to be very aware of the level at which we apply the comparison.

### 4.3.2 Connecting polarities — the lemniscate

We would now like to go on to the realm of the *middle*, and its importance with regard to polarities and threefoldness. First, however, some considerations about the lemniscate as a connecting figure.

Strictly speaking, the lemniscate is not a shape but a movement. If we only concentrate on the shape of the lemniscate (see continuous line in Figure 4.5), we might miss discovering the polarity which is so characteristic of it. Only by following the line, moving along with it through the drawing, can we distinguish the difference in character of the inside loop and the outside loop. If we follow the direction (along the dashed line), it becomes obvious how that takes us from the inside to the outside. Doing that, one also will realize that the midpoint is a *turning point*, where the transition from 'outer' to 'inner' takes place.

#### **Assignment 9**

*Transformation in a Lemniscate*

*We would like to begin by recalling Assignment 3, which dealt with the sphere and the radius.*

*Using a large piece of paper draw a large lemniscate, applying dynamical drawing, i.e. keep moving as you draw. As in Assignment 3, take note of how this activity feels, and take note of your degree of consciousness.*

*Once you have made the shape, begin bringing in a variation by expanding one loop, and making the other loop correspondingly smaller. What do you notice?*

*Try drawing a lemniscate with several parallel bands of color.*

The 'secret' of the lemniscate is that it is a movement which combines and transcends the polarities of sphere (here a circle) and radius. At the periphery (point P) the movement is circular; the centre (A) is not actually drawn, but is invisibly and necessarily there for the circular movement to be able to be carried out around it. After all, a circle is a combination of all the points which are equidistant to a given central point (remember Assignment 3). In drawing a lemniscate, the circle with center A is not completed. One could put it this way: before the circle could be completed, another point begins to attract and pulls one away from a one-sided circular movement, and this point B 'prevails' and takes over. This time, however, the movement is similar to the one of the radii moving through the center of drawing Assignment 3. A straight line moving towards middle point B now gives direction to the pencil and this time one does go through the visible central point B. This straight movement could potentially be carried on to the periphery into infinity, but the invisible center A' now attracts the movement and bends it into the circular movement around it, and so on. In this lemniscate movement, the central point alternates all the time, shifting from A to B to A', back again to B, etc.

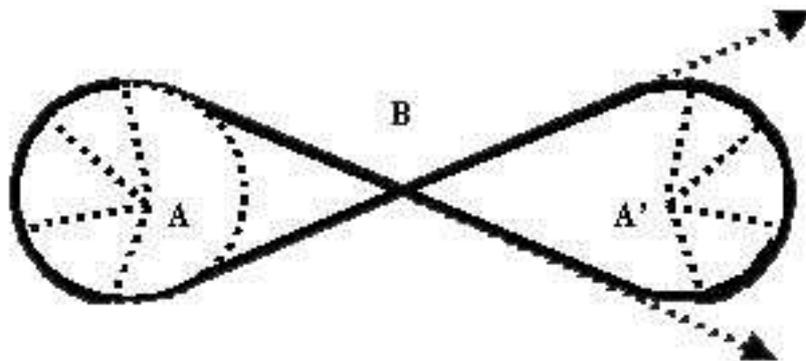


Fig. 4.5

The lemniscate is, so to speak, a 'breathing' figure, one that transcends the polar one-sidedness of radius and circle (sphere) in a movement which connects both polarities. The lemniscate is neither circle nor radius, while being both at the same time. The lemniscate is the continuum which combines the two, yet also stands 'above' them.

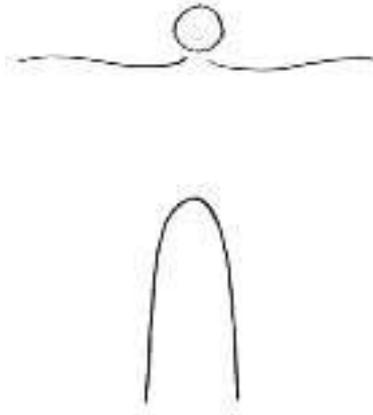
The concepts 'transcend' and 'connect' can help us understand the unity within which the polarity does in fact exist. The one polarity helps us recognize the other. In the quote at the beginning of the chapter, Goethe said, 'We must use the darkness in order to make light visible;' to this we could add: 'and also the other way around.' We showed this in a dynamic and comparative approach to ovum and spermatozoon, and to head and extremities. If we were to imagine a dimension which would simultaneously be light and dark, it could be no other than one which carries both light and dark 'within,' without *being* either light or dark. Were this dimension to be *either* light or dark, it would present itself as one of these. Goethe called it *sinnlich-übersinnlich* (sensory-supersensory);<sup>8</sup> he pointed to a dimension which is not exactly visible, yet can be known. Polarities could thus be looked upon as two manifest extremes of a middle dimension which can be surmised from the extremes. The two poles are visible, the middle transcends the visible.

In the case of the sperm cell and the egg cell one can even form a concrete image of this in one's imagination. Are sperm cell and egg cell not one-sided, polar developments of

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<sup>8</sup> Rudolf Steiner, *Goethe's World View*

something like a primordial sex cell? Out of that same sex cell they have each developed into polar opposites: the egg cell as 'cytoplasm,' the sperm cell as 'nucleus.' To help us imagine this in the example of head and extremities, study the drawing on the right (fig. 4.6)



*Figure 4.6*

*The human form*

Let us recall the two poles into which a lemniscate can diverge. On the one hand there is the closed-off circle, focused on the center, on the other hand there is the open radius, focused on the periphery. The drawing illustrates this principle at work in the human body.

#### **4.4 The middle as a place of encounter and interaction**

The exercise of thinking through the lemniscate brings home how one pole is the other one turned inside out. The other thing it teaches us is that the two poles are in fact connected and exist within a unity. That is a general law of polarities. The poles are to be seen as one-sided (specialized) manifestations of something which exists between them, a middle dimension, to be thought of dynamically as being of a higher level, straddling and uniting both poles, not coming to manifestation itself. One could postulate that the two poles became 'form' versus 'process' (or motion) whereas the middle dimension remains in the middle of in-between (rhythm). So the middle carries within it the potential for both polarities (and-and character), while at the same time standing above the poles and being neither (neither-nor character).

Bearing in mind that all shapes come into being through movement (discussed in Section 3.1.3), we can postulate that the two poles are each one-sided manifestations of one single dimension which comprises and unites the movement (process) of both.

This realm of the middle is characterized by rhythm, which will be shown below. Rhythm can be understood by picturing the process of breathing. The two extreme poles of breathing are inhaling and exhaling. In themselves, these are 'deadly.' Breathing, which is closely associated with life, connects these extremes in a process of rhythmical alternation between the two. Breathing is not a fixed thing, but a process; being within that process and maintaining it is essential.

Goethe described this connecting dimension of the middle as being on the sensory-supersensory level. The feeling of 'treading water' mentioned before, is naturally connected with this dimension, due to the fact that it is not visible, unlike the two poles. However, it can be known, and we will now look for manifestations of it in the skeleton.

#### 4.4.1 Trunk and Ribs

The individual rib should initially be classified as a 'limb'. Even though it is bent, it does have a beginning and an end. In anatomical nomenclature one speaks of *caput*, *collum* and *corpus* as one does with regular long tubular bones. If one looks at the rib cage as a whole within the entire skeleton, this picture changes. The thorax then appears to us as a 'head.' The soft parts are inside, and, visible and palpable as it is, the rib cage is unmistakably an exoskeleton (the single rib as such is absolutely mobile, an endoskeleton). The connections are not as rigid as those of the sutures, neither are they as flexible as the joints in the extremities. The rhythmical movement of breathing in and out is limited; it is a combination of inert form on the one side and movement on the other. The cranial ribs are almost exclusively enclosing, as is the head. Going down, they gradually become less connected to the sternum until finally -, in caudal ribs 11 and 12 - they end in two pairs of loose 'extremities'. The lower ribs are also more mobile. The thorax thus occupies a kind of middle region between head and extremities. Cranially, we see the enclosing, spherical gesture of the head (skull), caudally we see the radiating openness of the limbs. We're dealing with more than a mixture of the two, however. We are looking, after all, for the middle in the sense of a dimension on a higher level here. The mixture as such is a sense perceptible reality in the shape of the thorax. But we can also look at the rib cage as a *function* of the activity of the two polar qualities, whereby the whole is more than its parts. With this we imply that individual ribs are certainly like limbs, but transcend that quality in their mutual function as part of the thorax, wherein they become a head. The skull is an anatomical given; it remains intact long after death even though its 'enclosing function' within the living organism is no longer needed. With ribs, it is different. Soon after death, when the body has decayed, they 'return' to what they also are, namely a collection of loose 'spokes.' The 'thorax head' is something one can see not so much in the parts, but from the total arrangement of the parts. The thorax head is on a higher organizational level. The thorax is a performance by the ribs on a higher functional level: Goethe called that the principle of '*Steigerung*' (functional elevation).

#### 4.4.2 Trunk and Vertebrae

What is the place of the individual vertebra within the polarity of skull and extremities? *Spina bifida* shows that 'openness' is pathological. The vertebral arch closes itself off into the vertebral foramen, like a mini-skull. The spinal cord, which lies within the spinal canal formed by these foramina together, is enclosed as the brain is in the neurocranium (skull).

Taking a step up and looking at the vertebrae within the totality of the human skeleton, we see the *spinal column*. Over thirty vertebrae together form a firm yet flexible column which physiotherapists sometimes call 'the fifth limb'. Just as with the thorax, one sees how the individual components transcend their individual nature and together build their counterpart. The vertebrae have built something that has the character of a radius in this column. The 30 odd 'heads' make an 'extremity'. The fact that the spinal column is unmistakably an endoskeleton coincides with this observation. In vivo, all that is noticeable of the whole complex spinal column are the spinal processes. The enormous muscular columns of the erector spinae cover the rest. The resulting column, however, does not have the rigidity typical of the long tubular bones in the extremities. The radius character here is not one of shape, but of *process*; the spinal column 'achieves' the form of the radius in its totality. The possibilities for movement are quite different from those of the extremities; no angular movement is possible, the spinal column as a whole can bend into curves, whereby the rhythmical element stands out again, which we also recognized as a characteristic of the thorax. We thus recognize the spine as an extremity not in the parts, but from the sum of the parts. The spine is an extremity (a limb) at a higher organizational level.

#### 4.4.3 The unity of rib and vertebra

Looking at rib and vertebra together, the similarity to a lemniscate is striking. The vertebra can be seen as a head, the two(!) ribs attached to it as limbs. Heads have minimal mobility (too much movement is actually pathological); for the extremities movement is possible, in fact, they should move. This unity as such does not reveal the essential character of the organization of which it forms a part, namely the trunk. When we picture the trunk, it turns out that we can speak of the head and extremity dimension again, but reversed this time. The head is now extremity (spinal column), and the extremities are head (thorax). The trunk is head and extremity at the same time, but not only in the sense of 'in between.' In the dynamics of the shape of the trunk we see the anatomical manifestation of the process which is both head and extremities simultaneously, while also being neither. But this process of 'coming to manifestation' does not go as far as it does in the case of the two poles. The thorax, for example, never becomes an anatomical 'enclosure'.

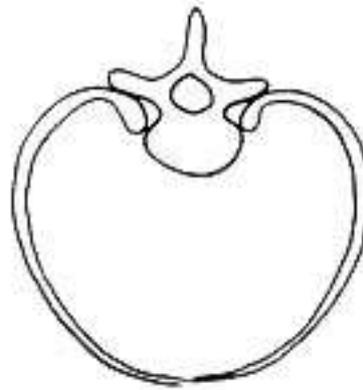


Figure 4.7

#### 4.4.4 The concept of *Steigerung*

In a case like this Goethe used the word *Steigerung*, intensification, progression, enhancement, rise, or increase.<sup>9</sup> In the encounter of the qualities of 'head' and 'extremity' a higher organizational level becomes 'visible' (not in a sensory but in a supersensory meaning, which is to say it becomes recognizable and conceivable). One is faced here with a dimension which is neither of the polarities, yet contains them. Goethe derived this concept from his theory of colors. After countless experiments and a long period of research, he came to the conclusion that colors manifest where light and dark meet. The color grey is the mixture, the passive confluence of light and dark. Colors, however, are the active middle, the active meeting of those two qualities. If one would have asked him the question of what preceded dark and light, Goethe might have answered something like: 'Light and dark are expressions of a dimension of a nonmaterial order which is neither light nor dark and at the same time both light and dark. Colors are that nonmaterial dimension become visible.'

Thorax and spinal column present the picture of the dimension which can be 'seen' in every lemniscate. This dimension itself does not become visible, but is at work 'behind' the visible phenomena and can only be known as such. That is what is meant here by the middle, a supersensory quality that can nevertheless be experienced, and thus be understood and known. In Figure 4.8 the relationship between the two poles and the middle with its rhythmical quality is expressed in a triangle.

<sup>9</sup> Rudolf Steiner, *Goethe's World View*.

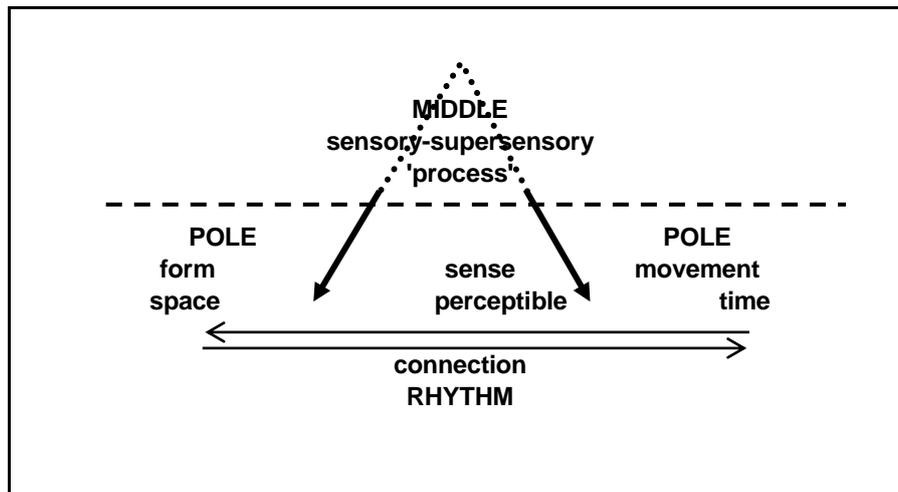


Figure 4.8

#### 4.5 Rhythm as the quality of the middle — rhythm and life

As well as the polarity of closed and open (sphere and radius) we came to see in head and extremities the polarity of inertia (form) and movement. These two qualities are united in rhythm. Rhythm is a constant swing of the pendulum between the boundaries imposed by form and the radiating outwards of movement.

We have seen that poles are one-sided. This one-sidedness is transcended by the rhythmic quality of the middle. The realm of the middle expresses the quality of not falling into one-sidedness; it mediates, because it connects as well as it creates space between the two polarities. We have seen this above in the shape of the skeleton, and the picture gains considerably in richness if we think of the rhythmical process of inhaling and exhaling, of systole and diastole, of contraction and relaxation, etc. In this example breathing is the process of life. Keeping up the one-sided activity of inhaling leads to death. The same applies to exhaling. Life reaches a deadlock in the extreme polarities. This example also shows that the middle is much more than 'the mean,' or 'the average.' In the middle there is a process which comprises both poles and is of a higher order, which is certainly not found in a kind of halfway point between inhalation and exhalation.

*Life is a process, a 'breathing in and out' between poles. Life is rhythm. Much is contained in this statement. Rhythm is always **threefold**. There are three parts to it, two of which, the polarities, are manifest and visible. The middle, by its very nature, remains invisible. Therefore visibility implies polarity.*

#### 4.6 Making the invisible middle visible.

In all these considerations the following question presents itself 'To what degree can adopting the dynamic, participatory stance contribute to achieving supersensory perception?' Having arrived at the middle domain or sphere, it may have become obvious that this quality has brought us one step closer to grasping the principle of gesture. In the poles one seeks to discern the results, the end products, of the formative forces. Those are the visible phenomena. Dynamic perception sees *through* the physical manifestations and penetrates to the level of gesture. Once having pushed through to the quality of the realm of the middle, we have reached a dimension which is unmistakably both sensory and supersensory, and we enter the level of the original process behind the visible phenomena. In the case of the

skeleton, we have the calcified bones in which the formative gesture can be recognized. The gesture of the Gestalt which expresses itself in the threefold division into *head — trunk — extremities* only becomes recognizable if we start at a higher systemic level. Limiting ourselves to an analysis of the parts, we cannot gain access to experiencing this Gestalt or process. Once again, Goethe summarizes this concisely:

*In the palm of his hand he holds all the sections,  
Lacks nothing, except the spirit's connections.*  
[Dann hat er die Teile in seiner Hand,  
Fehlt, leider nur das geistige Band.]<sup>10</sup>

Towards the end, we introduced the notion of threefoldness. Dynamic perception was a necessary prerequisite for recognizing polarities, and once these have been discerned, the perception of threefoldness follows logically. In the following paragraph we will continue demonstrating this approach in another example of human anatomy.

## Interlude

### Conception seen as encounter in the middle

Before conception proper takes place (i.e. before the pronucleus of the egg cell fuses with the pronucleus of the sperm cell), one single egg cell and several hundred (even thousand) of sperm cells form a biological unity, which exists for several hours. This preconceptional attraction complex (PCAC) is a necessary prerequisite for actual conception, which starts with one sperm cell being accepted. PCAC lasts for several hours, and it is a crucial period of a choice being made. Much hangs in the balance; both the egg cell and the sperm cells have to meet very specific conditions before a specific sperm cell will 'penetrate' or is being accepted. This is a period during which a very fragile equilibrium exists. Once optimal conditions are reached, the whole 'mechanics' of being admitted, melding etc. happens in a flash. Before that, it is a time of 'putting out feelers.' No obligation exists and everything is open. Both sides are in a situation of a precarious balancing of probing conditions.

With regard to the biological relationship we can see a transformation taking place. We must imagine that both gametes are derived from an original sex cell. The one gamete has become a one-sided 'nucleus-head,' the other has turned into a 'cytoplasm-ball' (see Section 4.2.2). During this time, ordinary biological conditions are totally reversed; normal cell conditions have turned inside out. In normal cells, the nucleus is both structured and structuring inside a dynamic, active and changeable periphery of cytoplasm. But during PCAC, cytoplasm is the calm centre with the nuclei moving around it in the periphery.

One can picture this as follows: Imagine turning the cell inside out the way one does with a glove, and think this through to the end. Eventually this leads to the situation of the preconceptional attraction complex. (Compare also Assignment 5). It is as if the two gametes recreate 'the cell' at a higher level during this subtle and fragile play of assessment. PCAC is a joint achievement: the two polar components progress together to 'the cell,' bringing it about anew. In contrast to the cell as we normally know it, this one is of a higher order. One can imagine that something else takes its entrance during this stage of openness and encounter. It is as if matter is raised out of normal biological circumstances. In this state (less biological, less like ordinary matter), it becomes accessible for another, nonmaterial dimension, which can connect with substance (incarnation). You can at any rate think about it or imagine it that way.

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<sup>10</sup> J.W. von Goethe, *Faust*, Full quote: "Who for living knowledge thirsts seeks to drive out the spirit first. In the palm of his hand he holds all the sections, lacks nothing except the spirit's connections."

## 4.7 Threefold perception

### 4.7.1 Introduction

Perhaps the title 'Threefold Perception' does not quite correctly characterize our methodology. In this chapter we have up to this point practiced the dynamic approach. This is inseparably connected with discerning polarities. As indicated in Section 3.1.3, dynamic perception includes three aspects: 1) describing *details*; 2) including the *total picture* within which the various details must move; 3) perceiving the *dynamics* resulting in the eventual proportions of the forms within the total picture. Recognizing polarity is not possible without comparing and contrasting. That, combined with the dynamic approach, gave us insight into the *gesture* behind the polarities. Going further, we inevitably come to the dimension of the middle which bridges and unites polarities, something which is both sensory and supersensory. The two poles appear in the sense perceptible realm, but by its very nature the middle exists in the realm of the invisible. Whereas polarity therefore always implies visibility, the middle always implies a rhythmical process.

When we speak of threefold perception, we mean an approach to nature and the human being which recognizes that creation manifests the polarity of *spiritual principles* and *matter*. In the anthroposophical vision of the human being and the world, this spiritual reality is the starting point. Although this spiritual reality does not lend itself to conventional 'proof,' it is, however, verifiable in observed phenomena of threefoldness in the human being and in nature. The dynamic approach demonstrated here, combined with thinking and observing in polarities, is the minimum requirement for being able to perceive this threefoldness. In the next paragraph we will give another example of how to direct our observation and thought, followed by a summary of the consequences of this approach.

### 4.7.2 Upper and lower pole

To begin with, let us posit the polarity *cranial-caudal* in the human being. In that framework, let us compare the dynamics of the head/skull on the one side with the dynamics of the belly/pelvis on the other side. Many of the polarities we discovered whilst looking at the 'axis' of the head in contrast to the extremities, will be recognized here too. Apart from that, other polarities become manifest. Once again we suggest starting with independent observations. In the chart you will find a number of criteria offered as a guide to discovering the polarities. It will be obvious that the head represents a polarity opposite the 'counter-head' pole of belly and pelvis along this axis, and also that the principle of turning inside out is recognizable again.

The chart uses the term 'counter-head,' because this axis of *upper pole* and *lower pole* should be seen in connection with the aforementioned axis head-extremities. In that case we were dealing with the center (head) and the periphery; here we are dealing with upper (head) and lower. This also makes it understandable how the terms *upper pole* and *lower pole* are often used in anthroposophical terminology to indicate the *nerve-sense pole* and the *metabolic-limb pole*. Within such a frame of reference we do away with the dissecting approach. Most current textbooks of anatomy and physiology treat limbs and intestines in completely different chapters. With this approach one sees connections between domains which are currently seen as belonging to completely different disciplines. Threefoldness in the human being is not so much an anatomical framework; at best it could be seen as a morphological framework: we are dealing with the spatial relationship of *process*. It would be better to speak of 'spheres.' These spheres (or poles) do exist in space, but not in a Cartesian sense, they are not located anywhere as it were. Localization, topography is a typical Cartesian notion. Polarity thinking or threefoldness has nothing to do with (spatial)

anatomy it is more like a process of morphology. Recognizing threefoldness automatically leads to seeing connections with the field of psychosomatics and different disciplines and makes a connection between different and now separate disciplines visible. Later on we will show how the polarities of threefoldness can be seen in more than one axis or direction. Take for example the unity of the rib and vertebra. Dorsally, it has the character of the so-called upper pole and ventrally the character of the so-called lower pole. Moreover, once we have learned to see it in one place, we will recognize the principles of threefoldness manifesting within each part of the body, and within every organ and on every level which can be perceived macroscopically or microscopically. Think of the nervous system which has its upper pole in the neurocranium (above) and the spinal cord (behind) and its lower pole in the peripheral nerves on the axis centre–periphery, whereas the vegetative autonomous intestinal plexus forms the lower pole on the axis centre–intestines.

This gives a small indication that we can see threefold polarities in several directions and dimensions and the more we see, the more the certainty of topographical space falls away. We may feel we are treading water, but we will find a new foothold in the *topography of processes*. This topography stands 'above' physical anatomy, while weaving 'through' it at the same time. Here we enter the sphere of the sensory–supersensory again.

#### 4.7.3 Three levels of consciousness

Two of the criteria mentioned in the chart will be elaborated on here, because they can help us understand the polar relationship between the spiritual and the physical, working in the two spheres. The polarity *vital–non-vital* is one which obviously applies to the whole of human morphology. On the axis upper–lower, the non-vitality of the nervous system stands opposite the belly/pelvis area with its predominating vitality. One manifestation of this is the fact that nerve tissue is far less able to regenerate itself. The scope of this polarity widens when we take into account the criterion of sensitivity to radiation. Apart from nerve tissue, striking examples of tissues which are totally or almost totally insensitive to the mutagenic effect of radioactive radiation are fat tissue, muscle tissue, and collagenous connective tissue. By contrast, bone marrow, testis tissue, and almost all epithelia (skin and intestinal tissue among others), are very sensitive to radiation. Presence or absence of mitotic activity is evidently related to this difference.

In the one type of tissue, the possibility of cell division, growth and regeneration (signs of vitality) have become lost, which is a hallmark of the upper pole. The organs concerned are fully formed. *Form* and *structure* predominate, which is a characteristic tendency of the upper pole. In the opposite type of tissue, time is still a factor in the biological process: the anatomical form is a shape in time here. The physical representative of these organs and their tissues is a passing one. The lower pole tendency of *process* still predominates. We use the word 'still' here because we know from the history of the embryo that all organs and tissues have partaken in processes of growth, transformation and regeneration. In the upper pole the process comes to a standstill and solidifies into form. In extreme terms, the brain is all but dead. In the lower pole the process remains active and vitality predominates. Think of it this way: the organs and tissues of the lower pole remain 'embryonic' in a certain sense. This also helps us understand why the human body as a whole is so sensitive to radiation during the embryonic phase. During this phase the entire human being must be or 'behave' like the lower pole.

The polarity *vital–non-vital* is related to the polarity *conscious–unconscious*. Where there is vitality, only sleeping consciousness is possible. Sleep is so much the normal state of consciousness in such a mass in regard to vitality, that it is actually pathological if the functioning of the lower pole organs and tissues comes to consciousness (think, for example, of a stomach-ache). On the other hand, vitality must apparently recede to enable

consciousness to light up. An absence of vitality is a necessary prerequisite for consciousness. *Vitality and consciousness are opposites*. Where things are broken down and where there is form, consciousness can arise. In this polarity of waking–sleeping, one can imagine a middle realm of dreaming consciousness, having the wakefulness of sense perception on the one side, the sleeping character of sinking into unconsciousness on the other.

	HEAD POLE	COUNTER HEAD POLE
PARAMETER		
Form (spherical or radial)		
Concentric-centrifugal		
Motion - Inertia		
Temperature		
Exoskeleton - endoskeleton		
Articulation (one – many)		
Hardness / consistency		
Closed / open		
Smell		
Sound		
Degree of moisture (relation to water)		
Degree of consciousness		
Degree of vitality		

All this throws new light on the threefold organism of the human being. In the anthroposophical paradigm the human being mediates between spirit and matter, and the relationship between the two apparently varies in different areas within the body. ‘Form follows movement’ was the adage of Chapter 2. The dynamics living in the so-called upper pole and the so-called lower pole confirm this. The upper pole - characterized by form, structure, and lack of vitality with corresponding wakeful consciousness - is *secondary*. The lower pole comes first; process is *primary*. Consequently, death is no longer primary, but comes forth out of life; not only does this totally reverse current dogmas, but it throws new light on the two different ways in which the relationship between body and spirit can manifest. In the sphere of the lower pole the relationship between creator and creation, i.e. the relationship between spirit and matter, is close, like hands shaping clay. In this sphere where

the formative processes disengage from matter, like hands leaving the sculpture when the final product is achieved, process stops, form 'appears,' and the spirit is set free (of the body). Viewed this way, consciousness is like a waking up *from*. Where spirit disengages itself from the body and 'leaves' it, consciousness lights up; where the closeness of the lower pole relationship remains, spirit submerges into the unconscious.

This view has tremendous consequences; it totally changes the way we look at the human being. It enables us to see that the spirit is not exclusively linked to the nerve-sense system (upper pole). It is not limited to that; the human being is also present and active as a spiritual being in the lower pole. The nerve sense sphere, with its upper pole relationship between spirit and matter, can now be understood as a 'carrier,' which enables us to have wakeful consciousness. In this view, spirit is present throughout the body, but it has a different relationship with different areas. In the lower pole, spirit works *with* matter (process; shaping; metabolism), there is no consciousness, and the sleeping quality of the embryo is retained. In the upper pole, spirit can free itself from the body, one of the consequences of which is wakeful consciousness. Here spirit works *from* matter. If one follows this train of thought, threefoldness acquires its true *psychosomatic* meaning: it is about three levels of relationship between spirit and matter (body).

Roughly formulated, that comes down to a tripartite division of human consciousness into:

*wakefulness — dreaming — sleeping,*

which, in the respective spheres of

*upper pole — middle realm — lower pole,*

allows the soul functions of

*thinking — feeling — will*

to work on three distinct levels of consciousness.

We will hear more about this later in this training manual. Here we just wanted to show that a participatory stance, practiced together with the dynamic approach, can be the key to seeing sense perceptible, physical data quite differently. These data need not lead inescapably to a materialistic worldview; through this approach, those very data allow us to recognize the spiritual dimension of the human being. Whether one penetrates to the reality of the spirit does not depend on the facts themselves, but is determined by one's orientation. It all depends on where one stands, how one thinks.

### **Assignment 10**

Consider the verse by Rudolf Steiner below. If one has studied and considered what has been written up to now, one might have gained a good foundation for understanding this verse, which is a pithy condensation of the threefold view of the human being. Try to immerse yourself into and partake of the 'directions' which sound in the verbs. Note that this verse, which aims to summarize that which makes us human, starts with the middle.

#### *ECCE HOMO*

*In the heart feeling weaves,  
In the head thinking radiates,  
In the limbs will surges.*

In dem Herzen webet Fühlen  
In dem Haupte leuchtet Denken  
In den Gliedern kraftet Wollen

*Weaving of radiant Light,  
Strength of the Weaving,  
Light of the surging Strength,  
Such is man*

Webendes Leuchten  
Kraftendes Weben  
Leuchtendes Kraften  
Das ist der Mensch

## 4.8 Four phases of human development

This section deals with prenatal development, with human embryology. We set two aims. The first is giving an example of the phenomenological, dynamic approach in regard to the human being. We will deal with the central question: 'What is the human being involved in during his embryonic phase?'

The second is to demonstrate the dynamics of the four members of the human being during embryonic development.

This section presupposes familiarity with the dynamic, comparative approach as explained in sections 4.0 to 4.3.2. Our focus is as follows: we will specifically look at the *somatogenesis* (*formation of the body*) of the embryo as a whole, i.e. the process whereby the outer form of its body comes into existence and develops during the embryonic phase. We will thus limit ourselves to a specific aspect of this development; i.e. somatogenesis; the formation of the different organs and organ systems (*organogenesis*) will remain outside our focus.

### 4.8.1 The four kingdoms

By way of introduction, we would like to give a brief sketch of what is at work in the four kingdoms of nature. This is a subject in itself, worthy of a much more thorough treatment than can be given here. This chapter will also describe the dynamics of the four members of the human being. These dynamics resemble the dynamics during the four main phases of the *individual* human development - *ontogenesis*, which in turn are mirrored by the four large phases of the development of humanity *as a whole* - *phylogenesis*. We will start with a brief summary of the four phases of human development as distinguished in anthroposophy.

As an entry into these four phases, we should first recognize the dynamics of the four kingdoms of nature. Anthroposophy recognizes these as 'precipitations' of an evolutionary process having taken place during the course of time. As stated before, every shape is the end product of a process and in every form we can 'read' how it came into being, by empathetically immersing ourselves into the formative processes and trying to re-live them. The gestures of the four kingdoms therefore bear the stamp of the underlying evolutionary *process*. This is also where we find the link to embryonic development, because of the dynamics having a related signature. During the course of the chapter it will become apparent how studying the dynamics of the great phases of evolution deepens our understanding of embryonic development and vice versa (!).

Anthroposophy recognizes an increasing separation into the different members, taking place during the course of evolution. This applies to the whole Earth, nature, and humanity. The *mineral* kingdom is characterized by the presence of pure (dead) *matter*. The higher kingdoms (of plants, animals and humans) have *life* in addition to matter. To distinguish animals from plants, we recognize the presence of *soul*. In addition to matter, life, and soul, the human being is permeated by *spirit*. The visible kingdoms are the result of the activity of formative forces.

	<i>physical body</i>	<i>etheric body</i>	<i>astral body</i>	<i>I (am)</i>
spirit				HUMAN BEING
soul			ANIMAL	
life		PLANT		
matter	MINERAL			

*This chart presents only a rough indication, which will be elaborated later on.*

## The mineral realm

As stated above, the *mineral realm* is characterized by the presence of a physical or material body. Here, the spiritual beings which have induced the formation of the minerals, have 'released' their product as it were.' The spiritual entity which has formed the mineral does exist, but does not dwell within the mineral; it is not directly connected with it any longer. Of course the physical characteristics of the mineral do show us which spiritual being shaped this matter. In essence, minerals are pure form, occupying space. We are dealing with a formed end product. We could best describe this as an 'upper pole process' which has been followed through all the way to the end (see Section 4.7.2). In that sense matter can be compared to an organism which has died. The members which have shaped it have 'left it', have released it; shaped matter (mineral kingdom) is all that remains. In what is left, only the laws of matter, of physics and mechanics, rule. In anthroposophical terms, the mineral 'only' has a physical body. Note that the concept of 'physical body' is not totally synonymous with the concept of 'material body.' By physical body we mean that body which is only subject to the laws of lifeless nature. During the present phase of Earth development, those are the laws of matter. In matter, in the mineral the particle rules as it were. Divide a piece of iron into two and you have two pieces of iron, four pieces of iron and so on. This continues until the smallest particles of matter we know remain, namely the molecules.

## The plant realm

We look upon the plant as a living being. In anthroposophical terms this implies there being an etheric body. In this kingdom, matter is not only subject to the material laws of physics and mechanics; it partakes in a higher level, namely that of the living organism. In contrast to the minerals, time plays a part in the living plant organism. The plant also interacts with its surroundings, which takes place by means of its metabolism. The etheric body is sometimes described as a *body of time* or a *body of formative forces*. Having a physical body, the plant is of course also subject to the law of gravity, but in essence it strives against these laws. The apple falls from the tree because of its material character; it grows and ripens on the tree due to the life forces. The unit of life therefore is not the particles (not the cell) but the whole, the *organism*, appearing in space and time. You cannot subdivide a living organism in unanimous identical particles: there is no rose molecule so to speak.

## The animal realm

The plant organism is characterized by life; the animal organism has an additional dimension or level in living matter which is being permeated by soul. In contrast to the plant, the animal has an inner life capable of interacting with its environment. The plant certainly does have a form of 'behavior', but that is being expressed by its morphological (outer) shape. The animal has the possibility of displaying behavior by moving its outer shape. With animals, we can begin to speak of perception and consciousness. In anthroposophical terms, the astral body distinguishes the animal from the plant. We can recognize this new dimension by the whole complex of instincts, behavior, and actions which animals display. We also speak of a *sentient* body, or a *soul* body. The metabolism of the animal organism becomes dominated by *catabolism*, being an expression of the fact that soul processes, perception, and consciousness cost energy and lead to the breaking down of 'life.' The etheric body, by contrast, is *anabolic*, being permeated by vital forces building up life. Let us recall in this context the previously mentioned and explored polarity of vitality and consciousness.

## The human being

In Anthroposophy we speak of the incarnation of the individual, who, like the animal, has this inner world of instincts, sensations and experiences, but can also face these and become aware of them. Self-awareness and independence are hallmarks of the *I (am)*.

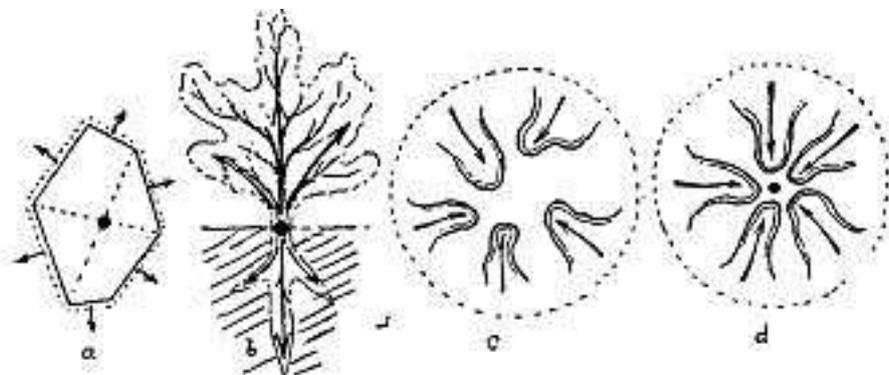


Figure 4.9

*In these illustrations, the basic directions which the four natural kingdoms have in relation to space are represented. These are respectively: Center and periphery; Outer and inner; Direction out from the self; Direction towards the self. a. Crystal; b. Plant; c. Animal; d. Human being. Notice the reversal of direction and the polarity between plant and animal. Derived from O.J. Hartmann<sup>11</sup>*

This summary introduction of the anthroposophical vision of the four kingdoms of nature can never do justice to the complexity of the subject but it is one way of entering into the dynamics of the four members. There are several ways of reading the signature of the four kingdoms. One of them is the approach starting with the *four elements* of earth, water, air, and warmth (see Chapter 7). We can associate the mineral kingdom with earth, the plant kingdom with water, the animal kingdom with air, and the human being with warmth. Students are advised to treat this as a topic for independent study.

Our starting point in this section will be the approach of O.J. Hartmann (see bibliography). He describes the relationship of the 'organism' (insofar as we can speak of an organism in the case of the minerals) to its surroundings and expresses this in the relationship of the *center* (point) to the *periphery*. Figure 4.9 is by Hartmann and, we propose that to begin with the reader try to meditatively enter into the dynamics of the four kingdoms represented here.

The schematic representations of Figure 4.9 indicate the *directions* of the four natural kingdoms with regard to the relationship of the periphery to the center. We intend elaborating on these four directions and elucidating them further during the course of this chapter. We are dealing here with directional processes and dynamic principles characteristic of the four natural kingdoms and we distinguish them from one another. The recognition of these dynamics will enable us getting to know the gestures of the four natural kingdoms.

For the considerations to be brought up below, it is important not to consider the four members as 'stacked on top of one another,' neither in the course of evolution nor in the sequence mineral, plant, animal, human being. It is important to stress that the dynamics - 'direction' in Hartmann's terminology - of one level is opposite to the dynamics of the following one. So the dynamics of the plant are not brought about by the mineral; they are not a continuation or 'more of the same.' A new principle manifests in the plant which stands in direct opposition to the mineral. We could think here of entropy (the striving of dead matter

<sup>11</sup> O.J. Hartmann, *Die Gestaltsstufen der Naturreiche*.

to reach the lowest energy level), and the opposite striving of the plant to reach a higher level of energy. The etheric body is not a product of the level below, being the physical body, but stands in opposition to it in a sense. Hartman expresses this in his chart of the dynamics of the various directions. With the mineral, the point represents the physical centre. Growth and expansion come about by that point repeating itself. Space is filled with more and more particles (points), being many physical repetitions of themselves. L.F.C. Mees refers to this kind of 'growing' as accruing, or adding on, whereas the plant, by contrast, grows out from a starting point, which is the seed. It does not come into being by physical repetitions of the initial point, but by the metamorphosis of the initial point, repeated during *the course of time*. There's no such thing as a plant particle repeating itself and having an identical form. This also helps us in understanding the animal not being the continuation of a plant. Once again, we can speak of opposition.

As noted above, the animal distinguishes itself from the plant by having an inner life; we could simply call it 'an innerness'. This should not only be taken in the anatomical sense (the inner world of the organs) but also in a psychological sense; the animal has an 'inside,' which gives it independence from the world around it. Instead of growing out as the plant does, one could speak here of growing *in*. This happens literally in the embryo (gastrulation), distinguishing it from the seed. Plant and animal, *etheric* and *astral*, form a polarity; they are 'opposite in direction' Hartmann would say.

In the human being, this 'innerness' subsequently acquires a center, serving as a point of orientation for the innerness. In contrast to the starting point of the crystal, that point is not physical, but spiritual. This does not imply it not being able to be perceived; everybody is familiar with the core experience of the 'I' in the human being. So once again we can speak of an opposition. The animal's inner life is 'undirected,' the human being has a centre towards which the inner life orients itself. The same principle applies as before: the human being is not a continuation of the animal principle. Something different takes the stage. Self-awareness presupposes an object (the self) we become aware of; it is not the product of awareness. Symbolic for this faculty of coming to oneself is the possibility of the human body to center by coming to an upright equilibrium or balance: of all the mammalian organisms the human body is the only one where the center of gravity is organized within the body. The force of gravity pulls the animal 'away' from itself towards the earth, to the environment; it succumbs to it as it were. Because the human being withstands the force of gravity and thus is able to maintain the upright position he/she can come to him-/herself whilst centering, balancing.

This much for the first general characteristics of the four natural kingdoms and their dynamics or 'directions.' Before we continue looking at the dynamics of the human embryo in order to intensify the very summary observations given above, we insert an exercise for the reader to consider, and a methodological remark.

### ***Methodological note***

*The problem of finding words for observations such as these has been remarked upon before, in Section 4.2.4. There are many ways of indicating dynamics or gesture, say, of 'the plant,' or 'the etheric.' Each describes a different aspect of the dynamics. It is practically impossible finding universal concepts for the gesture of the mineral world as a whole, or indicating what lives in a plant. The feeling we get, which we called 'treading water' in Section 4.2.4, is literally one of losing the ground under our feet, but that belongs with this territory. It is inherent to the conceptual level we enter, namely the level of gesture.*

**Assignment 11**

The chart below contains key words relating to the four kingdoms of nature. They are partly from this text, and partly inspired by the work of O.J. Hartmann and L.F.C. Mees. Going down, they try to characterize gesture and dynamics of the physical body, the etheric body, the astral body and the 'I' respectively. Try to immerse yourself into the indications and also connect them both horizontally and vertically.

MINERAL	PLANT	ANIMAL	HUMAN BEING
dead (body)	life	soul	spirit
grow on (= accrue, add on)	grow out	grow in	grow out of (beyond)
.....	extent (exterior)	content (interior)	.....
maintain self	form self	feel self	know self

**4.8.2 Our mineral nature – the first week**

Figure 4.10 depicts human embryonic development during the first week. The fourth drawing in the top row represents the morula stage which under normal circumstances is reached around the third day after conception. The last drawing (below right) depicts the situation just before or during nidation or implantation. This is the *blastula stage*. All this takes place during the first week of human development.

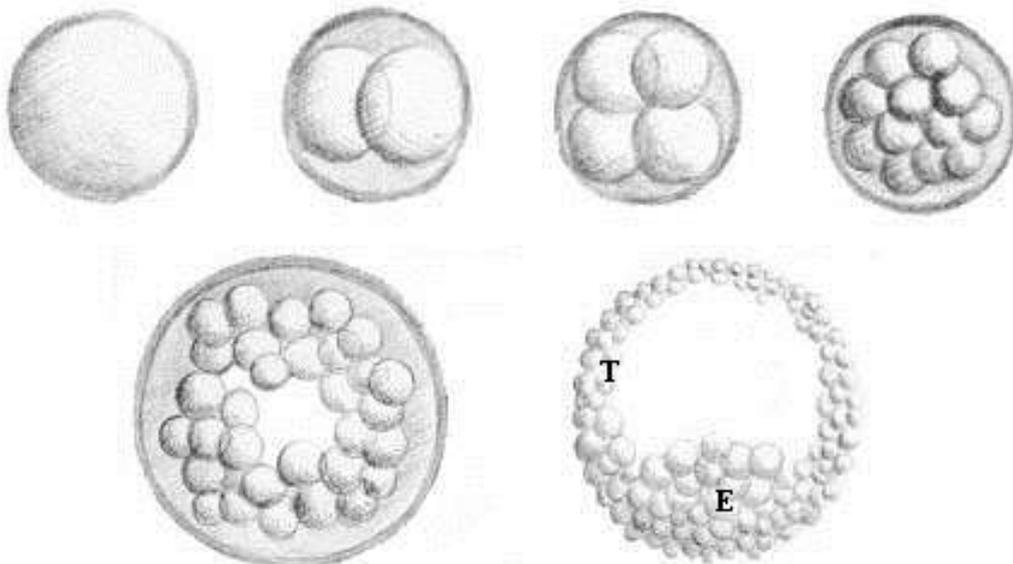


Figure 4.10 Stages during the first week of embryonic development, going from zygote (top left) to blastula (bottom right). E = embryoblast. T = trophoblast.

It is very important to realize that the last two drawings are not on the same scale as the first four; they are considerably enlarged. In reality there is no increase in mass or volume during the entire first week. It is characteristic for this first phase that all cell divisions occur within the mass of cytoplasm contained within the *zygote* (fertilized egg cell). This finds expression

in the word *cleavage* sometimes used for segmentation. There is as yet no growth, otherwise so characteristic for a living organism. The *zona pellucida* which surrounds the egg cell only dissolves during the last phase of the first week. Only from that moment onwards will the embryo begin to grow. As stated, during the first week all cell division takes place within the space of the so-called zygote. After about three days the stage of the 16-cell *morula* is reached, and after five to six days the embryo has been divided into approximately 100–120 smaller cells (*blastula*). This also means that the first stage of this development is NOT a cell or a 'fertilized egg cell': as soon as the egg cell is 'fertilized', she stops being a cell and becomes a body, a *unicellular* organism called *zygote*. This means that we do not 'start' by first being 'a cell' and that by multiplication of cells a body comes forth, but that in fact the situation is the reverse: we are from the very beginning an organism, a whole, which subsequently is subdivided, organized in(to) cells!

The total process has the character of a *subdivision*. In other words: The *whole* zygote splits up into ever smaller *parts*. Remembering what has been said about conception in Section 4.2, we also could postulate that whilst the embryo at the beginning of its zygote existence still exhibits 'egg-cellness' behavior this becomes more and more 'sperm cell like' behavior after conception. For example, immediately after fertilization, the *zona pellucida* undergoes a change. The 'open,' communicating character of the egg cell turns into a 'closed off' and inaccessible one (biologists state that this becoming impermeable of the zygote serves the prevention of a second sperm cell entering the egg cell). The metabolic character of the egg cell disappears and it becomes an enclosed space, just like the sperm cell. It is no longer open to its environment. As a 'result,' we see cell divisions and segmentation. We begin to see even more 'sperm-cellness,' because with every new cell comes another nucleus, more DNA and also more cell membranes. At the same time there is a loss of inner malleability, which used to distinguish the egg cell from the sperm cell, and an increase in structure. The following example could be seen as evidence of this. Whereas the egg cell was vulnerable and hard to manipulate, a *morula* can easily be frozen with state-of-the-art technology; at least it is not as difficult as freezing an egg cell. Was this not a typical trait of the sperm cell? The relationship of the nucleus to the cytoplasm slowly heads in the direction of what typified the sperm cell. One could formulate it as follows: what was still *outside* the egg cell before conception - and had its physical manifestation in the sperm cells - now appears as a process *inside* the fertilized egg cell. It is a bit like an island; it gives the impression of a 'spaceship' floating in the Fallopian tube and the uterus without having any particular metabolic exchange with the environment. In a sense the zygote slowly dies; it begins showing characteristics of death and tending towards the form pole. Some cells in the centre really do die off (lysis), and a cavity containing fluid appears (*blastula* stage).

We can imagine how such a process, carried through to the end, would be final. Predictably, development would come to a halt if there were more subdivisions, and the conceptus would change into a mass of DNA (like a sperm cell). Without the impulse of a new principle, development would cease here, which in many cases actually happens (modern estimates indicate 30 to 40 percent of 'fertilized egg cells' are not capable of nesting). Nidation (nesting or implantation) then does not occur, or is not sufficiently successful, and at the next menstruation the remainders of the embryo are 'expelled'. Later in this chapter we will discuss the new impulse becoming visible in the embryo if nidation is successful. It is important noting here that this represents a critical stage: if the development of the first week were to continue in the same way, there would be stagnation. Is this not exemplary for the fact that the whole development of the first week can also take place outside (without metabolic contact with) the maternal organism and that making contact (nidation) puts a stop to this way of being bringing the embryo to its next phase of being.

What can the dynamics of this first phase of embryonic development tell us? We are clearly dealing with a living entity. As stated above the zygote is not a 'fertilized egg cell', is not just one cell, but an organism consisting of one cell. The *morula* and *blastula* are the subsequent

manifestations of this living organism which the human embryo (or rather body) is. It is a living organism, but it displays more and more signs of death. Can we see tendencies of the mineral here? A related phenomenon is that modern IVF-procedure has brought to light that the rate of development during the first week can vary a lot and that we may assume that the so-called first week does not actually last a week but ends when the embryo starts nesting. This latter phenomenon could already happen after four days or only after 8 to 9 days after conception! As if 'time is not there yet'. Which time? Lifespan, lifetime so variable and specific for each different organism! Something to support this, we find in the fact that this phase always lasts a week, both in mammals and in the human being.\* We reiterate: the phase up to the moment of implantation (*blastula stage*) always lasts 'a week' *regardless of the total duration of the pregnancy!* This total duration can be twenty-one days for a mouse, twenty-one months for an elephant, or nine months for the human being. There are even animals, such as the deer, where development starts straight after fertilization, reaches the blastula stage, but then halts for a kind of hibernation. This period of stagnation lasts from the mating season until implantation occurs during spring! All this goes to show that *time is not there yet* during this first one week. Or to be more exact: the lifetime, which is characteristic for the organism, is not there yet. Did we not just specify time as a hallmark of life? It appears that this stage, during which the embryo is floating like a 'spaceship,' is deprived of life, like a mineral. This of course is not correct if taken literally (the blastula is a living organism after all), but the observation is correct, if understood in terms of gesture, or as a signature. Taking into account how Hartmann describes the characteristics of the minerals, it is easy to see how the beginning of the process can be described as a splitting up into a number of equal elements. Is that not a trait of the mineral, this being subdivided into identical particles, this repetition? We also see the notion of the verb 'maintaining' from the chart borne out: the whole is kept from falling apart. Here it becomes obvious, as it were, that in living nature the whole entity and the parts are a polarity. The organism, the body, stays intact when up against the opposite tendency, namely to fall apart into particles. Organism versus cellularity. This also could culminate in the statement that the 'unit of life' is not the cell but the organism, the whole, which in turn could mean that cells are not 'building stones of life' but represent an organizational principle, essential for life of course, but not a particle of life which organisms are 'built from'. Maybe the cells in their capacity to reproduce, to reiterate, to multiply, to clone, represent the particle, the actual principle of the mineral kingdom? The first week as a 'timeless' (period or eternity)? And the body of the 'first week' as a 'spaceship'?

If we return to Figure 4.9 with the chart of Hartmann's drawings for a moment, we can state that the morula shows the gesture of a 'crystal'; it has the mineral character being like a point in space, consisting of particles which repeat themselves. The aforementioned 'accrual' is a reproduction of the identical object in space. We see the same dynamics in the zygote when it splits up into equal segments, albeit in the reverse order, so to speak.

If we read this gesture correctly, it becomes plausible that the moment of nidation represents an interruption, a revolution. After all, something new has to happen if development is to continue. This interruption could thus be compared with the chasm existing between the mineral being dead and the plant being alive as explained in Section 4.8.1. There we postulated that life does not come forth out of death, and that the plant is not a continuation of the mineral. Here we see something similar, a turnabout which marks the transition to a new principle in the development of the embryo. The next sequel in the story of the embryo does not follow on from the first week. Before going on to elucidate the next stage of human development, we insert a few remarks about the concept of differentiation.

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\* We should realize that a week is a variable concept in biology. In human beings it is known for nidation to occur after five days in some cases, in other cases only after eight to nine days.

## Methodological Remark about Differentiation

*The last drawing of Figure 4.10 shows that more has taken place than a mere splitting up into equal parts. It is highly likely that the 16-cell stage still contains identical cells, but just before implantation a differentiation between 'inside' and 'outside' has taken place within the population of about 100–120 cells; there is now a center and a periphery. The whole of the conceptus has separated into an embryoblast in the center, containing about 10 cells, and a trophoblast in the periphery, containing about 100 cells and forming a mantle around the center. Between these two, cell fluid has accumulated, partly osmotically drawn in from the surroundings, partly the residue of cells which have died off. The cells in the periphery divide faster and form a type of epithelium (mantle layer), the so-called process of compaction; the cells in the center divide more slowly and also remain behind in regard to space. This is an excellent example of the process characterizing the (embryonic) development of all organisms: differentiation. We are used to thinking that organisms are built up from separate parts, so we think in terms of the whole being the sum of its parts, and with those parts, their characteristics. This way of thinking is deeply anchored in all of us; embryonic development serves as a constant reminder of this thinking model not being true to life. Over and over again, one sees how the whole splits up into parts. There is an endless series of differentiations, following one another in the course of time, creating the organs and the different parts of the body. It never happens the other way around!*

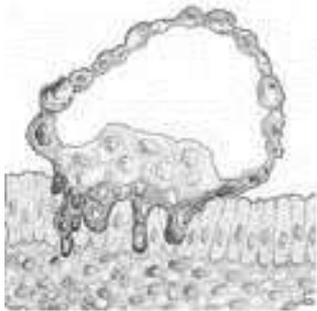
*An anatomist starts with the separate parts and thinks in terms of building blocks, from which the human being is assembled. But even in anatomy we once started 'at the other end,' and separated the whole into parts. Think of the Greek roots ana-temnein, to cut into separate parts; compare also the word ana-lysis. In our thoughts, we then put those parts together. It should be stressed once again that this is a mental picture, not an actual fact. In the reality of life, the undivided entity comes first; division follows. The embryologist Blechschmidt hits the nail on the head when he states that the 'law of the preservation of the individuality' applies to the embryo. One might question the term individuality, but the tenor is clear. 'It is the appearance which changes, not the essence,' he says. In the desert of modern-day thought-life, it is the embryo which cries out that wholeness comes first in living nature.*

### 4.8.3. Our plant nature – the second week

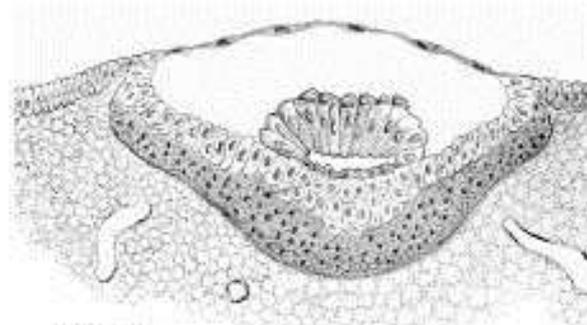
After the phase of the first week the unity of the zygote has become a duality: the embryoblast and the trophoblast as an inside and an outside. We should rather speak of a center and a periphery in the case of the embryoblast and the trophoblast. We will now continue and discuss the next phase, using Figures 4.11 and 4.12.

During the days that follow, the development of the embryo undergoes a radical change in character and dynamism (the 'direction,' in Hartmann's terminology). Especially the periphery begins showing a completely different development. An enormous activity in growth and metabolism manifests there. The trophoblast expands enormously. The activity of cell division is so vehement that cells on the outside even lose their structure and merge into a kind of cell-syncytium (the syncytiotrophoblast). All this almost resembles a malignant tumor activity, because of the trophoblast transgressing its boundaries and entering into the maternal tissue. By means of many enzymes the endometrial tissue of the mother is 'digested' and the embryo nestles deeper and deeper into the mucous membrane of the uterus. This character of transgression is even more emphasized by the fact that the maternal organism puts up no boundary: after a few days the embryo even 'eats its way into' the maternal blood vessels. The embryo reaches out still further into the periphery, beyond the anatomical boundaries of the syncytio-trophoblast! The trophoblast excretes quantities of hormones which though tiny in volume (best-known is the HCG, the hormone of pregnancy),

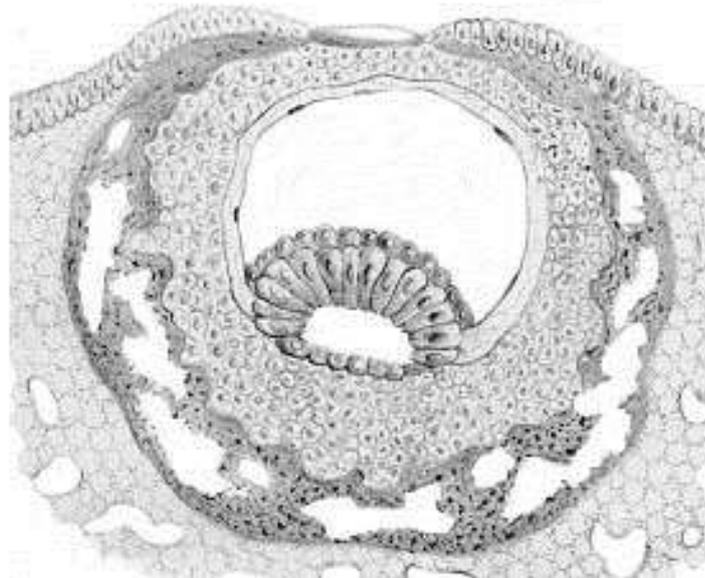
have enormous consequences far into the periphery. In this way it reaches out to the maternal pituitary gland: the whole maternal organism is influenced by those substances and brought into a state which is willing to welcome the new organism, which is after all foreign to it. It seems as if the basic gesture of pregnancy is one of relinquishing the boundaries of identity and immunity, which the maternal organism does in order to give the embryo room to nestle and expand within it.



**Fig. A**



**Fig. B**



**Fig. C**

*Figure 4.11*

*Stages of human embryonic development A. Directly after nidation; B. Day 7/8; C. Day 9/10. All drawings are on the same scale.*

This trophoblast is much more than the anatomical externals. Its dynamic gesture is one of striving outwards, being without boundaries, of growing beyond itself. It spreads out and merges with its surroundings, while at the same time showing characteristics of taking root and attaching itself. One could genuinely call the trophoblast the outer body of the embryo. This outside is where the embryo interacts with its surroundings, where its metabolism and growth take place, and where it expands. In its outer body the embryo grows and lives, reaching from the center to the periphery. The change it has undergone from the first week is evident. We have gone from a state of being a closed off 'spaceship' to being a growing, expanding and interacting organism.

Do we not come upon the same concepts here as the ones being used in Section 4.2.1 to characterize the ovum? Do we not see yet again that a 'cosmic pole' is at work? Once again

we encounter the problem of finding adequate words; there are many ways of describing the gesture which we can experience here. The gesture becomes more evident if we take the center of the embryo into consideration. The *embryoblast* also shows changes, but the dynamics are totally different from the dynamics in the periphery of the embryonic body at this stage. What occurs here is a differentiation into (pre-)ectoderm and (pre-)endoderm, a polarity we will not dwell on here. The manner of growth, however, and the relationship to the periphery are entirely different from those of the trophoblast. What we see here is slow growth with a gradual differentiation, but not the loss of form and the expansion which the trophoblast displays. The dynamics are not directed outwards here; rather, they refrain from that and are directed towards concentration. Now the amniotic cavity comes into being, and as a result the bilaminar germinal disk becomes loosened from the trophoblast. This causes an enormous internal tension to arise within the embryo. On the one hand there is the periphery (the trophoblast) striving outwards (centrifugal), on the other hand there is the center (the embryoblast), directed inwards (centripetal). This tendency continues into the second week, even though the parts change and new differentiations alter the details. The inside and the outside of the embryoblast and the trophoblast have now become manifest as *endocyst* (inner egg) and *ectocyst* (outer egg). Endocyst denotes the complex comprising the amniotic cavity, the yolk sac, and the bilaminar germinal disk; ectocyst denotes the trophoblast, which meanwhile has differentiated further. Even though the parts have changed, the dynamics unmistakably have stayed the same. The embryo is striving outwards during the second week; it is growing out continually. The core of the embryo — the bilaminar germinal disk consisting of ectoderm and endoderm — is the *center around which everything revolves*. The periphery predominates in the embryo; it does not contain, but it 'extains'. It reaches outwards so strongly, stretching to form roots in the outer world, with the result that the center stays considerably behind in growth. A whole new space comes into being, situated between the expanding ectocyst and the endocyst which stays behind. A cavity comes into existence which mediates and creates space, called the chorionic cavity. The mesoderm which lines this cavity (see Figure 4.12) forms a *body stalk* necessary for maintaining the connection between the 'outer' and the 'inner center.'

Extrapolating this gesture further, a being would come into existence only consisting of 'an outside' or 'a periphery'. Such beings actually do exist, but before dealing with them we will first return to the gesture of this second week. The dynamics manifesting here are the polar opposite of those of the first week! At that point the predominating tendency was all characterizing space, lack of growth, division, splitting up into parts and turning inwards. The embryo of the second week is striving outwards, is reaching to beyond. It loses the compactness of the morula. It also begins to grow in a manner we are used to in living creatures: there is increase of volume and also metabolism. This embryo does have a center, but it is no more than a starting point for peripheral striving. Everything seems to revolve around this center (the germinal disk, or embryonic disk), like a wheel around its axis.

Meanwhile the factor of *time* has become fully present in the development. With metamorphosis, differentiation and growth occurring, the embryo has begun to partake in the course of time; it now shows the dynamics of life. Referring to Hartmann's chart in Fig. 4.9, the dynamics may be evident: this embryo exhibits the gesture of the plant, which is striving more outwardly. This could be called the 'outward' or 'extent' human' A conclusion like this can only be reached by taking the phenomenological approach. We can characterize how plants extend completely towards the world around them; they sacrifice and open themselves, leaving them little possibility of emancipating themselves from their surroundings. Their morphology makes this visible. The roots extend and spread in the earth, while leaves and flowers do the same in the atmosphere, in air, light and warmth. Plants are so open; they become practically defenseless, and completely surrender to influences from outside. We can put a plant into a greenhouse, where it will respond to any artificial influences. The gesture of opening out is not only seen in its morphology, in branching out and unfolding towards the periphery, but also in its physiology. The plant completely

surrenders to its surroundings and has practically no way of closing itself off from influences coming towards it. It is also usually dependant on the seasons; it is being lived by the rhythm of the year. We could maintain that the plant is more 'out there' than 'here,' in itself. Plants are creatures of openness. According to the ancient biologists and their nomenclature vegetative nature is by no means equal to animate nature, however. There is no inner of a plant, a tree, it does not exist, spatially spoken. The plant lives in a surface, i.e. the thin layer of *cambium* between wood on the 'inside' and the bark on the 'outside', unfolding itself in the leaves and needles above (atmosphere) and in the capillary roots below (earth).

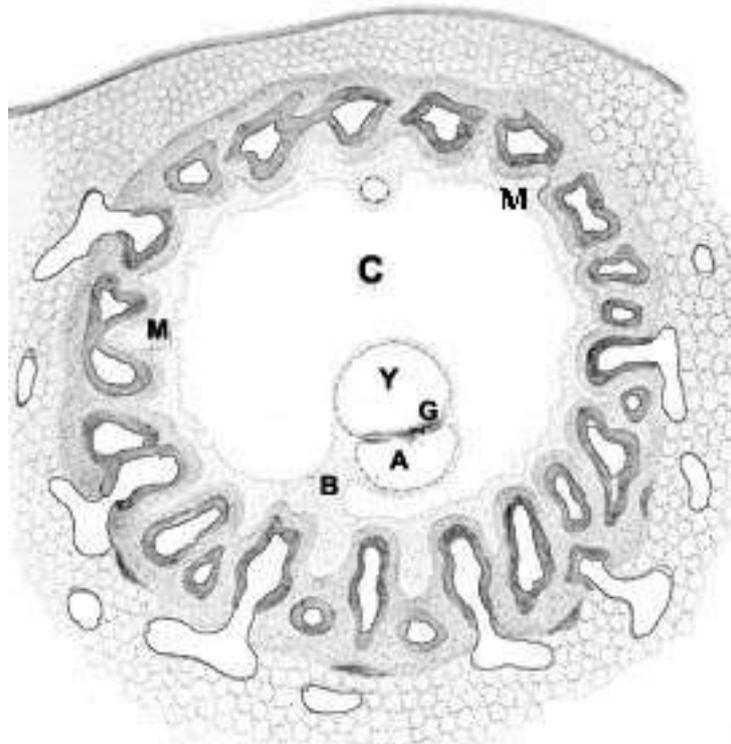


Figure 4.12

Human embryo of two weeks old. Note this figure is at a smaller scale than Figure 4.11. A amniotic cavity; Y yolk sac; G germinal disk; C chorionic cavity; B body stalk; M meso(-)derm).

Once we have immersed ourselves into Figure 4.9b, and we try imitating the gesture of the embryo during the second week with equal empathy, we become aware of this tendency to be 'out there'; this being is obviously not fully present 'here on earth' yet. As well as this, we can observe that the bilaminar germinal disk of the second week is not only the center around which everything revolves, but it is also flat and two-dimensional in appearance. At this stage the embryo consists of no more than two surfaces, which are the two epithelia making contact. So we cannot speak of 'content' yet, knowing there is no meso(-)derm yet, i.e. the dimension of space-creating tissue still being absent. Being two-dimensional, the flat bilaminar germ disc has only an outside, a periphery, an environment. Its 'direction' is from the center to the periphery. Key words characterizing the human being during the second week are thus: extending, planar, and plant-like.

We can easily imagine that, were this tendency to continue unabatedly, development would come to a halt and stagnate. We came upon something similar when looking at nidation. If the mineral tendency, manifest during the first week, had continued, further development would not have been possible. Nidation marks a turnabout in regard to the development and

the gesture of growth. To a certain extent, nidation is thus a moment of crisis, and many embryos cannot 'handle it.' Is there a similar moment for the embryo during the second week? Immersing yourself into the dynamics of the strong expansion taking place outside the central body, you can sense the danger threatening this embryo. The tension which exists between the endocyst and the ectocyst threatens to become a rift. It is also conceivable biologically because of the 'outside' abiding in optimal feeding conditions for growth and expansion — namely in the mother's mucous membrane, whereas the 'center' remains more and more behind and lacks any source of nourishment. At the end of the second or the beginning of the third week, the chorionic cavity has come into being containing tissue of a kind that mediates, connects, but also creates space. This is the meso(-derm) which connects and mediates between the two dimensions by means of the body stalk, which consists of mesenchym (mesodermal connective tissue) and by creating the space of the *chorionic cavity*. What would occur, were this tendency to continue? The so-called *hydatidiform mole* or the so-called '*wind egg*' clearly demonstrate that. Technically, we can still speak of a pregnancy in such cases because the extended 'outer body' has been created by the hormones and the amniotic sac (which in this phase represents the 'outer' or 'periphery body') is visible on an echogram. There is no heart, however, no so-called 'actual embryo', no 'inside' body. The thread is broken; the embryo has only an outside, and there is no human being 'here.' Just as the plant has no 'self' or soul, but only a physical and an etheric body, the 'wind egg' has not made it 'here,' but remains only out 'there.' The mother is told by the gynecologist: "You are not pregnant, there only is an amniotic sac", because for the regular gynecologist the placenta or adnexae are not the 'actual embryo'. The mothers involved however are certain that they are pregnant, but they are in despair about their child: "Where is my child?" Apparently it has not made it to 'here', it remained out 'there'.

The essential gesture of the second week becomes more and more apparent. The word 'plant-man' might give a partial indication of the character of the embryo at this stage. One could also claim that the embryo manifests the signature and tendencies of the *etheric*. This word denotes the life principle, which is at work wherever we perceive growth and metabolism and metamorphosis, where an opening out to the periphery and an inviting or even compelling of matter to change towards a higher level takes place. During its first week the embryo bore the marks of the physical, the mineral, showing tendencies of hardening, densification and a centripetal direction and with 'time not there yet'; during its second week we see a turnabout to the opposite: opening, a centrifugal motion towards the periphery, plantlike life appears, is added.

This impression is being reinforced by something else we can observe during the second week. We can see a special feature which will be lost later, namely that the 'actual body' can still be divided; up to and into the second week identical twins can still eventuate. Thereafter the embryo cannot be divided anymore; there is only a short span of time as an in-between phase during which a Siamese twin can come into being. "Cannot be divided anymore", does that not literally mean *in-dividual*? During the plant phase the embryo is not an individual yet. Could we speak of two human individuals within one body in the case of identical twins? In our sketch of the four natural kingdoms we indicated how we can only begin speaking of the soul in the animal kingdom, making it plausible of something else having to be added or having to become manifest for embryonic development to continue.

Rudolf Steiner indicates that during this early embryonic phase the human being 'is not there yet' but moves around his physical kernel and targets his center from the periphery. He describes this from the vantage point of supersensory perception. The embryo of the second week certainly makes the impression of 'not being here yet.' This could imply that Rudolf Steiner indicated something like the existence of a 'pre-embryo,' decades before regular embryologists came up with the same idea (incidentally, using much more questionable criteria). The big difference is that regular biologists conclude that the human being 'is not there yet' — a conclusion with vast ethical consequences! — whereas Steiner speaks of the

individual being definitely being present, but reaching out from another dimension to its physical kernel; the human being is present, but not 'here' yet (not yet within his body). Until the third week the spiritual impulse ('soul') that incarnates here is not 'anatomically' present within the actual body but it is present 'around' it.

When and how does the human being 'arrive' more? In order to tackle that question, we need to focus on the next phase. Before taking the next step, we first need to make an observation using Figure 4.9. The animal expresses its gesture of being the opposite of the plant. The animal does have an inner life, something which the plant does not have. What is the fundamental difference between a seed, the beginning of plant development, and the embryo, the beginning of animal development? The seed grows outwards — from the seed a leaf emerges and the beginning of the roots, and both of these unfold into the periphery — whereas the embryo grows inwards (gastrulation) and unfolds the world of the organs within. The plant lacks that inside dimension. In the animal the root system 'becomes' the intestinal surface; the crown of leaves 'becomes' the bronchial tree; rooting in the earth (the world around) 'becomes' movement independent from the surroundings. Emancipation goes further: an inner environment emerges, relatively independent from outside influences. The animal's temperature differs from that of the surroundings; the pace of life no longer follows the rhythm of the year. During animal evolution, this tendency is developed and perfected more and more. We will return to this later. These observations may suffice for now to point out that the animal makes a turnabout following a new and different direction. The animal is not a further developed plant; it is the opposite of the plant. Thus the process of emancipation and individuation begins.

#### 4.8.4 Our animal nature

Once again, the development of the embryo approaches a critical moment. Perpetuation of the developmental dynamics which characterized the embryo during its second week, would lead to a "wind egg", an 'exterior human being.' If that were to happen, the tie between periphery ('outside') and center ('inside') would rupture; the central point on the inside — the germinal disk — would become disengaged from the outside and atrophy. From the polarity between plant and animal which we studied in the paragraphs above, we could almost predict the turnabout waiting to occur in the dynamics of the embryonic development.

A look ahead shows significant developments at the end of the third week. The embryonic disk is still flat, but there is a crucial difference. Between the ectoderm and the endoderm — the aforementioned two epithelia, a combination which Blechschmidt calls *Grenzgewebe*, border tissue — an intermediate layer appears, namely the *intra-embryonic mesoderm*. Blechschmidt characterizes this as an inner tissue, *Binnengewebe*, and rejects the term mesoDERM. The mesoderm is no border area, no epithelium, it is not a *limiting tissue* like ecto- and endoderm as Blechschmidt calls it, but a tissue with a third dimension and should therefore actually not be called mesoderm: here we give preference to the term 'meso' or if you like '*inner tissue*'. The latter term does not indicate 'inside'; that is the inner or visceral body wall, here represented by endoderm mirroring the outside or outer and parietal body wall here represented by ectoderm. Meso creates space and connects at the same time. So we could state that the trilaminar germinal disc, in contrast to the bilaminar germ disc, now has the new element of 'content.' Its predecessor consisted only of a surface and its surrounding, the trilaminar embryo has inner content in addition to that. This mesoderm has made its way *into* the germinal disk, by growing *inwards starting* from the *primitive groove*. This process began in the middle of the third week of the embryonic development, as shown in Figure 4.13. We are obviously dealing with a radical turn in direction here. Where do these new dynamics originate?

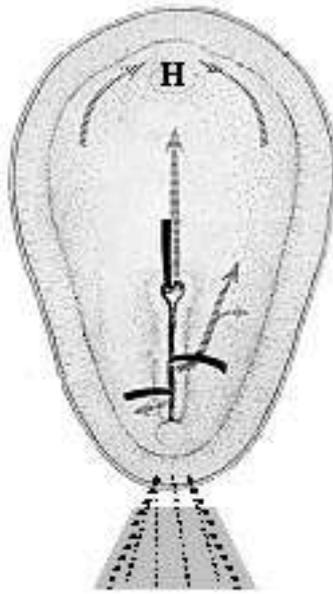


Figure 4.13  
 Germinal disk during the third week, seen dorsally  
 The arrows indicate the direction of growth of the interembryonic<sup>12</sup> mesoderm.  
 The body stalk (caudal end) has been drawn. H origin of the heart.

By the end of the second week, once the chorionic cavity has formed (see Figure 4.12), the so-called extra-embryonic<sup>13</sup> meso(-derm) covers the inside of the ectocyst and the outside of the endocyst. The former is called *parietal* or *somatic meso(-derm)*, the latter *visceral* or *splanchnic meso(-derm)*. The body stalk links the 'center body' (endocyst) with the 'periphery body' (ectocyst). At the beginning of the third week the first blood islands and blood vessels (capillaries) originate within this extra-embryonic meso(-derm). The formation of blood vessels and blood is the very first functional differentiation of the meso(-derm). Within this very primitive system of blood vessels a hesitant flowing of blood begins (not yet a circulation in terms of a 'closed' vessel system). This flow finds its 'cause' in the metabolic processes in the periphery of the embryo, the trophoblast (ectocyst). In our adult body the movement of fluids on a capillary level is also initiated by the life processes inside the tissues themselves; this is paralleled by the movement of the blood which takes place during the third week of the embryonic development, whilst it begins to flow from the periphery to the center. After all, the activity of the metabolic processes takes place in the periphery. The blood flows from the *somatic meso(-derm)* through the capillaries in the direction of the body stalk. By means of a variety of growing movements, we will leave out of consideration here, this body stalk has meanwhile shifted to the caudal end\* of the germinal disk (see Figures 4.12 and 4.13). This primordial blood flows towards the cranial end of the embryo, running alongside the 'flanks' of the germinal disk, then dorsally along the amniotic cavity (only very little) and ventrally along the yolk sac (some more). There it cannot progress any further and reaches here the central part of the embryonic body (see Figures 4.12 and 4.13). There, at the centripetal junction of the blood vessels, the primordium of the heart originates.

<sup>12</sup>The newly developed term 'interembryonic' is actually not literally correct but is used here to contrast with the regular notion of intra-embryonic meso(derm). The latter notion in my view is false: because this is only true if one consider the germinal disc to be the so-called "actual embryo". Which is not correct, at least one could call the germinal disc the 'actual body'.

<sup>13</sup> The term 'extra-embryonic' is only of significance if one considers the germ disc to be the so-called 'actual embryo' (or the 'embryo proper') and the trophoblast is considered to be the added adnexa and secundinae. Following the phenomenological approach as we have done here, the whole of the embryo represents the 'embryo'. Seen this way the chorionic meso should be considered 'intra-embryonic'. If one considers the germ disc as the 'actual body' then the so-called 'extra-embryonic meso' could be indicated as 'outer body meso'.

\* It is only at this point that the polarity cranial-caudal appears in the embryo. On the caudal side we find the body stalk with the blood flowing to and fro, on the cranial side the future cardiogenic area.

Another reversal of direction takes place within the embryo. Up to now the growth was predominantly directed outwards; at this point we see a first indication of 'the circulation' changing to a different direction. The blood flows from the metabolic periphery of the trophoblast to a central point, where it comes to a halt. The flow of blood turns about once it has reached this central point situated cranially in the germinal disk. It flows back through other capillaries to the periphery of the trophoblast, where it returns to the metabolic processes as tissue fluid. This point of reversal, where the flow comes to a standstill, turns about, and takes on a rhythmical character, is the first indication of the origin of the heart. Here the first real center arises within the embryo, which differs from the almost virtual, point-like center of the second week around which everything revolved, i.e. the two-layered germinal disc. By contrast, this is a real anatomical center, which takes its place *over against* its periphery of the outer body. It is the heart. The heart arises out of the circulation of the blood, not the other way around! As is so often the case, this approach places things in a very different context, allowing us to gain a perspective which differs from current findings. The movement of the blood is *primary*; the emergence of the heart is *secondary*. First there is flow, and where this comes to a standstill, the form arises. There are good reasons for looking upon the heart as the 'upper pole' of the blood circulation, \* and at the capillaries as the 'lower pole'. This is in accordance with the relationships existing within the embryo as a whole at this stage. The trophoblast on the outside is the lower pole; the heart with the germinal disk on the inside is the upper pole.

In every respect, the origin of the heart marks a turnabout of the dynamics within the embryo. As 'predicted' above, the developmental dynamics become more those of the animal; the direction now changes to one from the outside to the inside, from the periphery to the center; an inner world emerges, placed over against the outer world. Biologically we can put it this way: the continuation of the inner body, otherwise in danger of becoming detached from the periphery, is now safeguarded. Nutrition can flow from the periphery to the inner body. In the wake of the genesis of the heart area, we see a large number of developmental processes now, having their starting point in (within) the germinal disk. The most essential of these is, that starting from the caudal end of the embryo, inward growth begins. Along the primitive groove, ectoderm grows dorsally into the embryo and metamorphoses into meso(-derm). The existence of the embryo as a flat, two-layered disk 'without content' comes to an end and changes to one as a three-dimensional entity with real inner content in the shape of the intra-embryonic meso(-derm). All the impulses to forming organs now arise in this meso(-derm). Looking at the dynamics of the morphology of the heart within the embryo, we can recognize in this whole process a model for the way all organs are formed. The first impulse arises in the periphery, which then continues towards the center where it finally comes to rest, manifesting in the final shape of the organ. The developmental dynamics always move from the periphery to the center.

Halfway through the third week we can observe a new turnabout in the development. More and more clinical data have confirmed this in recent years. Up-to-date research shows that pregnancy is more frequently interrupted at this point than had hitherto been noticed. The 'missed abortion' is a clinical manifestation of the fact of the embryo having to take a hurdle at this point in its development. In the case of no heart originating, followed by the formation of all the organs, the embryo cannot survive this crisis. This is not insignificant, as we will substantiate below. The processes after the third week are not a straightforward continuation of those of the second week. This becomes even more poignant if we take into consideration Rudolf Steiner's remark about this phase from the standpoint of supersensory perception. At the beginning of the twentieth century, when orthodox science knew nothing about these

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\* Note that we speak of 'blood circulation' for lack of a better word. There is no closed circulatory system yet at this point. Blood is being 'produced' in the periphery, flowing to the center, from where it returns and is absorbed again as tissue fluid in the periphery. There is no closed capillary system. Only during the fourth week can we speak of a first placental circulation.

stages of human development yet, he emphasized repeatedly that a turnabout in human embryonic development occurs 'around the seventeenth day'. He put it this way:

Whereas the incarnating soul-spirit entity was up to this point more present *around* the physical kernel, the 'astral individuality' of the human being now incarnates into the physical kernel itself.

In other words, the human soul comes a step closer 'to earth,' with the heart being the organ of incarnation!

All this becomes even more coherent once we realize that the dynamics which arise in the embryo 'around the seventeenth day' are of an animal (astral) nature. Only now can we speak of a real inner entity which is able to stand over against the outside world and become independent. Does this not run exactly parallel to the dynamics which marked the turnabout from the plant to the animal, as discussed above? (Refer to the chart in Fig. 4.9.)

#### 4.8.5 Reading the gesture in evolution and embryonic development

Let us now review the three phases, gestures, or directions we have covered so far. We started with the characteristics of the three natural kingdoms, being akin to the dynamics of the physical, the etheric and the astral. In the description of the embryonic development of the human being we have so far described three phases, and more is to come concerning the third phase. The point is finding out in how far, 'translating' the phenomena characterizing each of these three embryonic phases is helpful. Can we gauge whether we gain a fuller understanding of what is at work whilst cross-referencing the essential dynamics to the characteristic signatures that can be 'read' in the natural kingdoms?

##### The physical body

The following terms characterize physicality: compactness, three-dimensionality, death, mineral. To what extent can we recognize these traits in the human being at the morula stage? Imagine taking a round ball of clay in both hands. Feel how it rests in itself. Sense the coherence, the mass, and the gravitation. Compare your findings with the way Hartmann's chart expresses these qualities. Concluding, we could sum up as follows: The physical rests 'in itself.'

##### The etheric body

Imagine a kind of material you can pull out towards the periphery and spread out, disperse. The being of the plant opens outwards to the periphery, whilst the mineral nature of the plant is being absorbed by the forces of gravity. Life counteracts the mineral, physical laws. Life works against gravity resulting in interaction with the surroundings (metabolism). We notice a parallel process in the embryo. The way it opens and strives outwardly, nearly losing itself in the periphery, is matched by the 'selfless' way of the plant relating to the environment.

##### The astral body

Life is being broken down, a catabolic tendency appears. Innerness is created which can hold its own against the outside and emancipate from it. A different state of consciousness arises in the animal. An inner environment has now been established, leading a life,

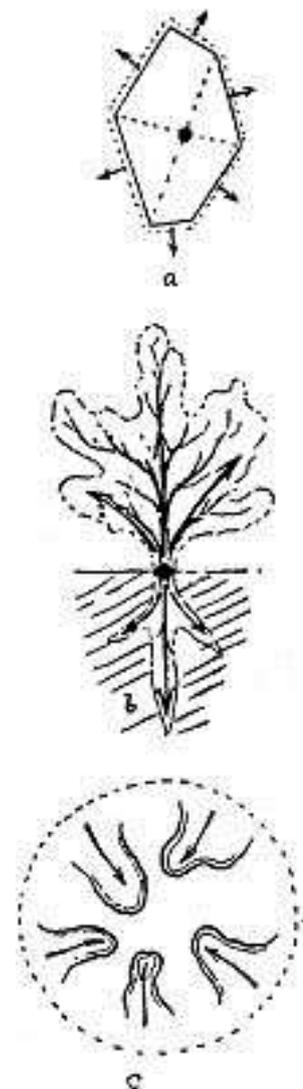


Figure 4.14

independent of its surroundings. It is capable of moving of its own accord and of establishing a relationship to its environment. This inner space is not only somatic, but also psychic.

Among other things the dynamics of the three embryonic phases teach us, there not being an even transition from one phase to the next. On the contrary, the dynamics of each subsequent phase are no continuation of the previous one but are their opposition. The line of development is interrupted, there are marked transitions. Can those be recognized in the dynamics of the three natural kingdoms? Current biology does indicate transitional forms between death and life (think of viruses) and between plant and animal. The comparative approach, however, clearly shows the plant not being a continuation of the animal, and the mineral not being a continuation of the plant. The etheric is not some sort of diluted materiality; but a totally different principle is at work. The astral is not a further refinement of the etheric; it is a new quality. Recognizing polarities makes us aware of this. Assignment 12 is given as a suitable preliminary conclusion.

### **Assignment 12**

*Make a list of as many polarities between plant and animal as you can name. Do the same for dead matter and living creatures. Once you have done this, check whether the polarities found also apply to the corresponding three phases in embryonic development, which we found to be akin to mineral, plant and animal. Make another comparison, this time between a dead person, a sleeping person, and a waking person.*

#### **4.8.6. More on animal nature — emancipation and individuation**

The trilaminar embryonic disk has only a preliminary independence. There is more to come in terms of emancipation and individuation. It is still flat and very open with its flanks making a smooth transition into the layers of tissue of the so-called 'extra-embryonic' cavities. The three layers merge into it as it were (see Figure 4.15a). The embryo obviously has a long way to go before truly becoming emancipated enough from the outer body of its mother to separate from her and live as an independent entity. At the tail end, the embryo is linked openly to the periphery by means of the body stalk. Steiner called this phase of human development 'der Paradiesmensch' (the paradisiacal human being), indicating, this only being a first step towards emancipation from the surrounding world which the embryo is still connected with quite naturally and openly. Is this not the ancient story about paradise being described in pictures? Man had emancipated from his cosmic and divine origin, but 'was still linked to God.'

During the third, but especially the fourth week of human embryonic development, the process of delamination occurs, also known as 'folding.' Interestingly, the Germans call this same process Abfaltung (folding off). This folding process, characterized by curving movements marks a significant progress in terms of emancipation. The flat trilaminar embryonic disk folds into a somewhat cylindrical embryo, whereby the sides curve towards each other. In ventrolateral direction, the ectoderm — and with it the initially dorsally positioned amniotic cavity — undergoes an enormous expansion in relation to the ventrally located yolk sack with its connected endoderm (see Figure 4.15). Apart from this so-called transverse folding, there is the longitudinal folding of the craniocaudal direction (see Figure 4.16). With the emergence of the embryo out of its two-dimensional plane (delamination means 'coming out of the plane'), we can now speak of a real, spatial outside and inside in the anatomical sense. The term ectoderm now comes into its own: what was the back (dorsal) of the flat disk is now the outside of the cylindrical embryo. Consequently, what in the endoderm was ventral is now the inside. It also becomes apparent that the terms 'inner' and 'outer,' until now referring more to direction (Hartmann), or quality, now acquire anatomical meaning. We can easily immerse ourselves into this gesture. Drawing it is one

way to do so. Better still, it can be imitated with body movements, as outlined in Assignments 13 and 14.

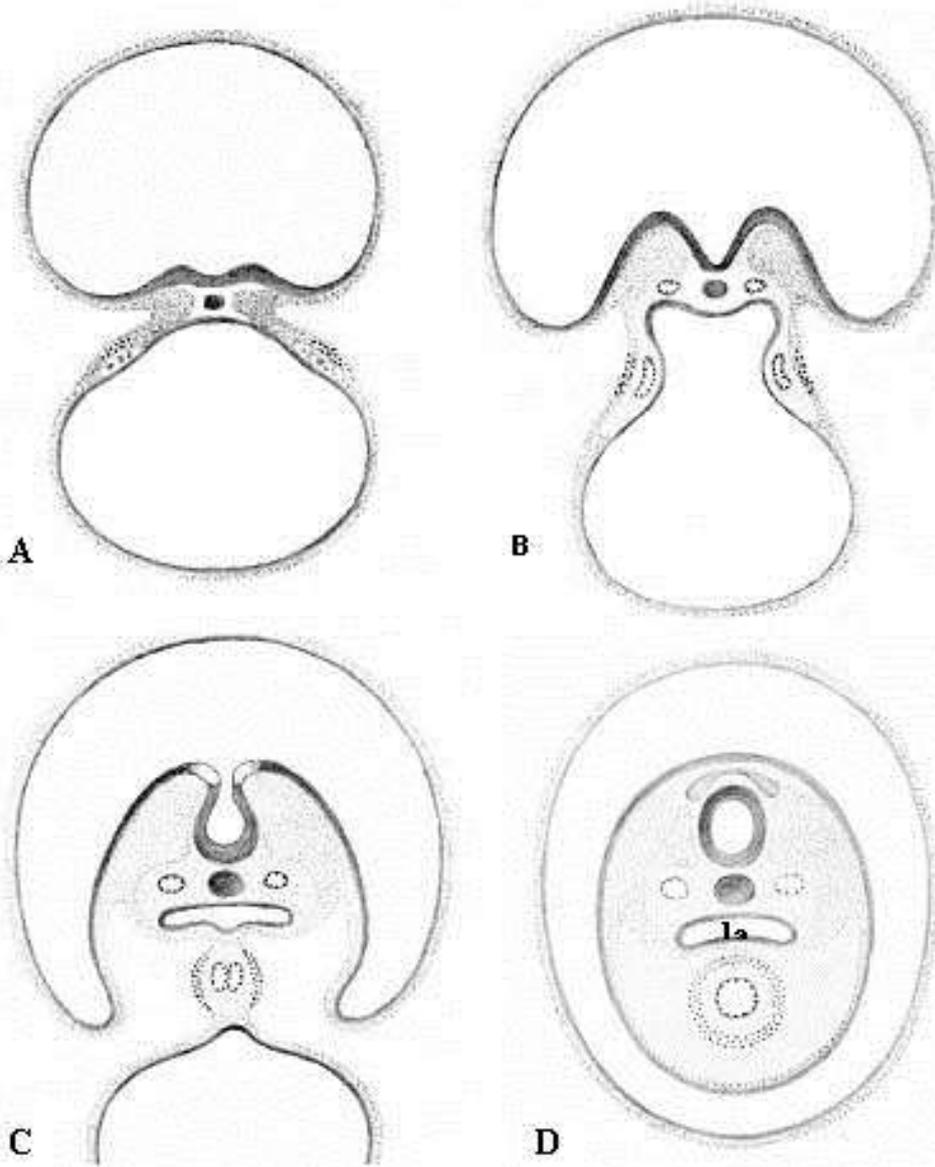


Figure 4.15

Diagram of transverse folding in the embryo during delamination. The dorsal side is up, showing the amniotic cavity (2), the ventral side is down showing the yolk sack (1). Figure A depicts the trilaminar embryonic disk before the folding process. Figure D depicts the completed folding process, where the folds have curved around to create a roughly cylindrical embryo. Now the ectoderm is outside, surrounded by the amniotic cavity (2a) and the endoderm is inside, having formed the wall of the primal intestinal tube (1a).

### Assignment 13

Stand upright and spread out both arms. Bend over while at the same time bending your arms and bringing your hands together. Check if and how your awareness of the surroundings and your own 'inner space' change. Could this be termed 'from extrovert to introvert'? From 'open' to 'closed'? Return to your original position. Repeat this exercise a few times, doing it slowly.

### Assignment 14

The embryo is kidney-shaped at this stage. See, for example, Figures 4.16 and 4.18. Try to find as many kidney-shaped forms as you can in nature, the environment, but also in the world of the organs. To what extent is the relationship between outer and inner the same as in the embryo? Or is the gesture of closing off (outer, ectoderm) and becoming enfolded (inner, endoderm) recognizable as a polarity, just as it is in the embryo?

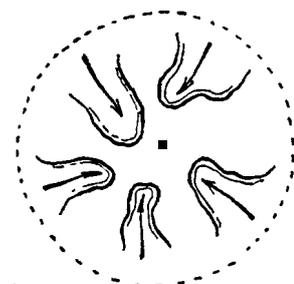
The motion the embryo performs here is a continuation of the gesture characterizing the turnabout on the 'seventeenth day' or halfway through the third week. The *animal/astral* gesture is being completed here. The embryo emancipates still further from the periphery. It is important to realize that these are *growth* movements, and not *muscle* movements. The formative process of the whole body is involved. This is *somatogenesis*. A growing gesture like this is a necessary precondition in order to give shape to the human body. We can even participate in the movement and continue with this until we feel we are 'gathering up' the inner body as it were; in this 'enfolding', we can feel the inherent danger of it getting cut off. If this process were to be brought to completion all around (cranio-caudal, left-right), it would surround the whole embryo with amniotic cavity and ectoderm, blocking off the nourishment from the periphery and the placenta, these being the outer body.<sup>14</sup>

It does not come to that yet! Because there remains one place the inner body is not completely closed off, remaining open until birth. That place is the navel. Around this two elements gather, from the tail end and from the cranial end. These are the body stalk and the heart. Consulting an embryology book to follow the process in the craniocaudal direction will lead to the logical conclusion of there has to be a concomitant process whereby the heart 'descends'. This is the so-called *descensus cordis*: as the heart moves down in the direction of the navel, the cranial end of the embryo (including the brain primordium) comes to be situated in the previous position of the heart at the top end of the embryo. At the other end the body stalk 'rises' from caudal to ventral, and only now can it really be called an *umbilical cord*. Through this the communication between the inner body and the outer body is safeguarded. That is for the time being at least.

We are dealing with the gesture of growth here, as we stressed before. We can try following the tendency of this growth and thinking ahead to the moment of *birth*. At birth the umbilical cord is irrevocably (anatomically and physically) cut. We could not imagine a more definitive physiological emancipation! The German language calls delivery *Entbindung*. Literally, this means 'unbinding,' so what was bound now becomes unbound. We could safely say that the dynamics of this process start already during the fourth or fifth week. Morphologically, these dynamics are being repeated in a physiological manner at birth. The curving processes of the embryo in order to create its inner world, with all the organs, could be regarded as the subsequent consequence of the astral impulse the embryo is subjected to. This is quite characteristic of our animal nature.

#### 4.8.7 What's next?

Another step needs to be taken to complete the dynamics of the embryonic process. This fourth phase concerns the transition from the animal to the human being. Or should we be speaking of a further turnabout? This question brings us right into the present-day polemics around the question of the human being, being an animal or not. Recalling Figure 4.9, we can expect finding an opposing gesture again between the animal and the human being. In order to define this, we need to distinguish between self-awareness and



4.14 d

<sup>14</sup> Actually one could state that here, morphologically spoken, the physiological birth is pre-exercised by shaping the 'animal body'.

awareness of the *surroundings*. In our deliberations above, we have seen how animal (astral) emancipation simultaneously enables consciousness to arise. With the creation of an inner world over against the surrounding world, the possibility of *awareness* arises: the outer world can now be perceived. This is easy to imagine. The condition for having this awareness and perception is separation. Something similar could be observed in the dynamics and the morphology of the embryo which we discussed. Hartmann indicates in Figure 4.9 how the human being takes a fundamentally new turn. The new direction could be described as finding a standpoint towards our own inner world, i.e. all our experiences and feelings. The word *standpoint* could be taken almost literally here. Hence the point at the center of the diagram depicting the human being in Hartmann's chart (see also the figure at the right of this page). We can experience a center in ourselves which is conscious of the fact that we are beings with self-consciousness.

Teilhard de Chardin put it this way: 'An animal knows, but a human being knows that he knows.' One could follow up this saying with numerous additions, such as, 'An animal thinks, but a human being knows that he thinks; an animal feels, but ... etc. '. In Anthroposophy this is attributed to the 'I' in the human being. This is the element capable of commenting on itself or capable of standing over against itself. That is what the 'point' in the figure represents, the stand-point.

Is this the new direction we were talking about? If we enter into the astral gesture of curving of assignment 13 once again, we can experience that as being finite. It finds its completion in a state of being closed off. The movement of delamination ends in a closed circle with an inner space. Which movement now is the opposite of this one and liberates us from this state? The Dutch physician L.F.C. Mees characterized the animal with the term of *growing in* and the human being with *growing out of* or *growing beyond*. Which movement gets us *out of* 'the astral' as it were?

The corresponding morphodynamics are *stretching*, or *standing upright*. The upright position is a uniquely human achievement. Although this topic is too extensive to be covered fully in this chapter, this statement is supported by everything written about evolution. Talking about uprightness here, we do not imply being a biped. Human beings share this feature with penguins and kangaroos, for example. Here we imply the head being balanced on the trunk which in turn balances above the lower extremities. The center of gravity of the trunk *above* the hip joint is not slightly to the front, as in the apes, or straddling, as in the kangaroos. To acquire this position, the necessary bodily conditions have to be met. Therefore we must anticipate a process of stretching in the course of *somatogenesis* during embryonic development. By these means, the formation of a body facilitating balance, is achieved, not only a body capable of moving in an upright position but one, capable of keeping itself upright and remaining that way. Gravity draws the body of the animal away from itself, attracts it to the earth, to its environment; in the human body the physical potency is exerted to come to him-/herself: the force of gravity brings us to ourselves.

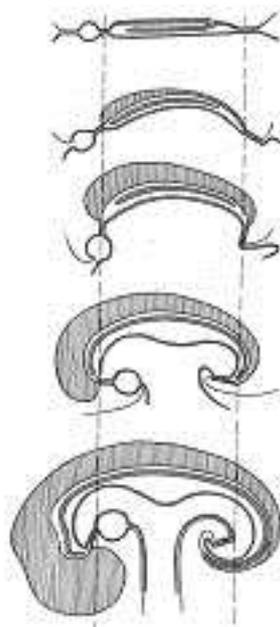


Figure 4.16

When discussing the birth process, we saw this being anticipated by the curving during the fourth or fifth week of the embryonic development. We recognized a similar tendency during growth, and characterized this as becoming 'unbound,' a process of becoming free. Similarly, the tendency towards uprightness, distinguishing the human being from the animal, has been anticipated in an embryonic gesture. The curving and pursing gesture, with the corresponding organ formation and the further emancipation of the amniotic cavity and the umbilical cord, continues into the third month. Simultaneously, the stretching gesture, the upright tendency so typical for the human being, already begins manifesting during the fifth week.

During the process of stretching, the head and the pelvis emancipate out of the round/oval entity the embryo still is during the fourth week. Gradually, the neck and trunk emerge (Figure 4.17). The side view (Figure 4.18) shows this even more clearly. Both head and pelvis come 'out.' The head grows cranially away from the trunk, whereby the neck appears, the pelvis 'turns' caudally 'away' from the trunk coming to lie under it, resulting in the waist being formed. This constitutes the visible stretching. The impulse for this comes from the inside by the elongation of the brain, whereby the characteristic flexures between the different parts of the brain come into existence. This is typical for the human being. With it, the development of the brain frees itself spatially, thus no longer remaining a continuation of the trunk axis. The whole process could be described as un-folding; the curled up embryo unfurls. The process proceeds from the cranium starting from the brain, then the whole head, followed by the neck. The formation of the waist and the emancipation of the pelvis from the trunk follow. The human lumbosacral angle is one of the deepest in the primates.

Is it not remarkable how this cranio-caudal gradient (predominant in many embryonic processes) is repeated in postnatal motor development? The head is lifted up first with the maturation of the primary senses, then the baby sits up, the pelvis is turned under the trunk, and standing up comes last. Once again, it is as if the embryonic morphological development (somatogenesis) was the 'practice' for the physiological functional development after birth. Once the head and the pelvis have turned out of the curvature, the necessary prerequisites have been created for the upright position of the human being.

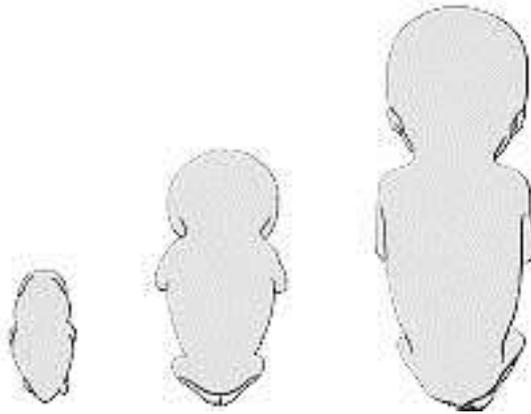


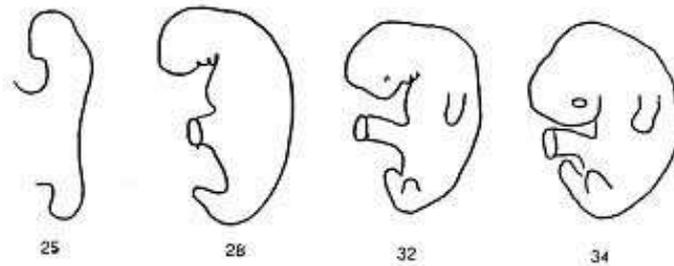
Figure 4.17

What is happening here is more than just stretching, however. A polarity begins to develop between the head on the one side and the extremities (limbs) on the other. The emancipating tendency of the animal (astral) process is apparently preserved in the head. This is actually a condition for proper functioning of this 'pole' in the human being (see Section 4.7). Over against this the extremities begin to develop. Up to now the predisposition for this was practically absent in the embryo. At the time of the stretching process occurring in the head (upper pole), the extremities (radii) are striving outwards into the periphery. It looks as if the human figure polarizes between closing off ('here'), namely the head, and opening up ('there'), namely the extremities. It is not difficult, recognizing the two poles of the polarity in the gestures of the head and of the limbs (see Section 4.7). Stretching and walking upright are likewise pictures of the balance between these polar tendencies: turning towards or away from the earth. This represents yet another manifestation of the polarity of the radius vs. the sphere, which we dealt with whilst discussing the conception.

The polarity between cranio-caudal (head-pelvis) also extends to both pairs of limbs (arms and legs). During the fourth into the fifth week the hands are positioned with their palms turned inwards resting on the heart (which at that time is relatively large). The feet are turned slightly outwards (with their soles turned inwards) up against the umbilical cord. In other words, the extremities are part of the predominantly round and curved gesture of the whole body at this time; just try it. (Come on folks, this is no worse than a little bit of eurhythmmy...!) Subsequently, however, the hands and arms grow outwards, and the legs and feet inwards. The palms of the hands turn to the ventral side, the soles of the feet to the dorsal side. This contrast between the endorotation of the arms and the exorotation of the legs leads to the polarity being so characteristic for the human being (because it goes with uprightness); it manifests in the anatomical posture. This anatomical posture, it could be said, is embryologically incorrect.

### **Assignment 15**

*Take your head between your hands and sense how much 'inside' there is. Turn your consciousness to your arms and legs and experience how different they are in that respect. Try to focus on the relationship 'inside/outside,' and 'here/there.'*



Series of stages of development in the human embryo. The numbers indicate the related Carnegie stages.

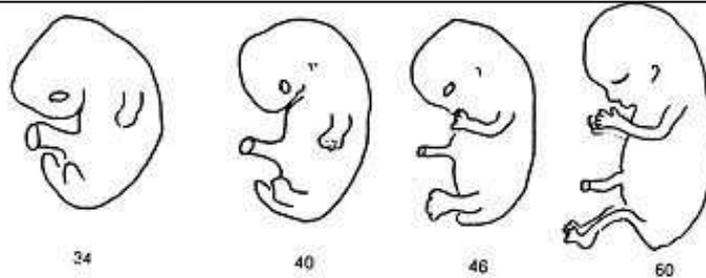


Figure 4.18

### Assignment 16

*Start in an upright position with your arms bent and your palms turned slightly inwards at the level of your heart. Now proceed carrying out an exorotation, stretching your arms. Continue with this movement until the arms are stretched upwards alongside your head with your palms turned dorsally. Now bring back your arms, rotating them inwards, continuing until they are stretched out alongside your trunk, with your fingers stretched and the palms of your hands turned to your dorsal side. Imagine your legs doing this movement.*

*We might come to the conclusion that the 'embryological posture' is one in which the human being is fully stretched and unfolded.*

Our upper extremities turn away from the earth, our lower extremities turn towards the earth. The latter are in connection with the earth and with gravity. Poppelbaum explains it as follows, 'No animal achieves the total harmony with gravity in the lower extremities to the same extent as the human being does'. Because our pelvis and our legs are able to completely carry us, our hands are freed. They are freed from locomotion bringing our arms and hands totally within the domain of manipulation. Goethe postulated the polarity between arms and legs in the human being to be an essential distinction; arms and legs differ both in function and physiology, which is found in no animal.

What does this say about the dynamics of the 'I' and the question of the human being versus the animal? The gesture of stretching and unfolding goes along with becoming freed from 'within'. We are looking for a new trend, for something not being the continuation of the animal/astral (expressing itself in the quite typical curvature with its corresponding dynamics). Is there something opposing this and freeing itself from it? We find this in the stretching motion with its corresponding dynamics. We could state that a new dynamic center arises in the strong polarity between the head and the extremities, being neither the one pole (head/astral/animal/closed), nor the other (extremities/etheric/plantlike/ open). In having to maintain the upright posture, the human being is a creature of *balance*. We can also describe it as finding our center or finding ourselves: within the human body "gravity brings us to ourselves" as it were. Cannot the latter be considered the anatomic-morphological formation of the organization of the "I am"? A being, able to find itself (self consciousness), ought to at

least be capable of making this gesture in a morphological and physiological manner as well (standing and walking upright, balancing).

We can find this tendency in all higher animals; various forms of stretching and unfolding occur in their embryonic development. But there is one difference: they never bring it to completion. Following the line from the lower to the higher mammals, via the apes to the human being, the tendency to continue stretching and *maintaining* that position manifests more and more strongly. The essential polarity of the two extremities (Goethe) *does not appear* in quadrupeds! The anthropoid apes (Pongidae) come very close to it, but soon lose the human traits which they have whilst very young. In other words, the morphogenesis of the human being is typified by stretching and becoming upright, accompanied by the unfolding and polarizing of the arms and legs, the head and the pelvis (all the upper and lower parts); all of this is necessary in order to stand upright in balance and *maintain that upright position and balancing into adulthood*. Standing upright is more than just an anatomical gesture; it is also a spiritual gesture. It is a gesture of resisting and preserving, maintaining an equilibrium in relation to gravity. In the animal, the center of gravity always lies in front of the spinal axis and it succumbs to its force. At the point where the animal succumbs to the force of gravity, the human being remains upright and is able to center! Perhaps being upright is a primary, being a quadruped a secondary quality, but pondering that would go beyond the scope of this book! This implies a view of the relationship between the human being and the animal radically different from the prevailing biological viewpoint. This has been worked out in more detail by authors like Rudolf Steiner, Poppelbaum, Schad, Mees and Verhulst. 'Resistance distinguishes the human being,' a revolutionary slogan claims. It points to a quality which is a hallmark of the 'I'. The point is not to postulate that 'the human being is not an animal,' the point is to recognize that 'the human being is *different from the animal*.' What we have described above gives us a picture of this difference. The different 'direction' (Hartmann); becoming upright; maintaining that position; finding a standpoint: these are key phrases to fill in this picture. Embryonic stretching shows us the corresponding gesture.

#### **4.8.8 Closing Remarks**

Having gone through all the complexities of this chapter, we will now return to Hartmann's scheme in Fig. 4.9. The aim of this chapter was highlighting the four gestures characteristic for the way the outer human form comes into being. Corresponding gestures were sought in the four natural kingdoms. The link between these two domains we found in the series of principles which in anthroposophy go by the name of physical, etheric, astral, and 'I'. These we found to be progressively present and at work in the four kingdoms. These four spiritual qualities are likewise to be found working in human development. In order to make these visible, we have tried to enter into the directions as indicated by Hartmann, and 'translate' them into 'somatogenetic' gestures. It is probably inevitable that this approach only leads to further questions for the reader. The intent of this chapter, however, was not to give answers but to stimulate further study. This approach opens up vistas reaching far beyond the discipline of embryology.

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