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# The informed performer : towards a bio-culturally informed performers' practice

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# Chapter 4: Information in action – generic perspectives

In the previous chapter, basic terminological spadework led to a historical menu of perspectives and possibilities with regard to the concept of information and its relation to the field of imagination. We discerned several types of information (metaphysical, environmental, intersubjective, biological), and modes of imagination (passive, active, mimetic, pragmatic, parodic, hermeneutical, creative). Next to these terminological groundworks, a psycho-pedagogical and activity-based approach to information (as opposed to an ontological one) surfaced as a promising framework for further defining the contours of an informed musicianship.

A next step in our deliberation towards granting information a considered status in the field of music performance involves zooming in on these functional aspects and the mechanics of information as an activity: how do people (in general) think, search, select and use information? Information, as a historically contingent term, does not favour such a generic approach into universal mental dispositions and behaviour. Within the spectrum of universality- and objectivity-seeking disciplines, cognitive psychology and its offspring ('embodied', 'situated', and 'ecological' psychology) provide probably the most punctual insights and specialised categories to account for the processing of information. However, our interest here is not primarily directed at what happens step by step, once information enters the mind of the user, but is more general in its aims and concerned with the distal causes and necessities that facilitate(d) the development of such capacity. The reason for preferring such an angle is that it allows for transdisciplinary common ground, for a generic, open, biological and pragmatic view on things that can be specified and integrated with the cultural particularities that surfaced in the previous chapters.[207] Hereafter, perspectives from evolutionary theory, developmental psychology, and Information Behaviour Research are presented with a view to come to such a bio-cultural dialectic.

## 4.1 Evolutionary perspectives

Evolutionary theory is an epistemic lens that is intrinsically concerned with the quest for common behavioural grounds and looks far back into the beginnings of human life on planet earth to see how early humans evolved into modern Homo sapiens with instinctive socio-cognitive abilities, including an information intelligence (Spink, 2010, p. 3). In *the Study of Information: interdisciplinary messages* (Miller, 1983), cognitive psychologist George A. Miller (1920-2012) coins the term 'informavore' to refer to an innate disposition with regard to information processing:

[207] It is a methodology that in the introduction is referred to as 'bio-cultural'.

> In *What is Life?* […], Erwin Schrödinger [points] out that organisms survive by ingesting, not food, not calories, but negative entropy[208]. It is no accident, of course, that the mathematics of entropy are also the mathematics of information. The analogy is obvious: Just as the body survives by ingesting negative entropy, so the mind survives by ingesting information. In a very general sense, all higher organisms are informavores. (Miller, 1983, p. 111)

Miller's analogy posits that, since a higher organism (such as a human) has a natural tendency to degenerate into a more disordered state, it needs to compensate for that degenerative tendency by ingesting order via a process of information, or negative entropy. Miller does not extend his metaphorical hypothesis but the idea is prolonged by philosopher Daniel Dennett (1991) who situates informavoreness in the 'early days' of the evolution of consciousness and considers it as a tool that favours the 'producing of a future' over simply 'hoping for the best'. According to Dennett, for rudimentary nervous systems it suffices to organize behaviours such as for instance tracking, anticipating, approaching, withdrawing. These activities are appropriate to what is in the immediate future and do not involve objective messages that merely inform in a neutral way about a certain condition, just for the sake of it. Better brains, however, can extract more information and can do it faster; moreover, to avoid noxious contact and to increase the chances of finding nutritious bits, they use approximate laws of the world. One of the primary elements that assists such brains is an orienting response: an organism gives every sense organ an opportunity to contribute to the pool of available and relevant information by stopping what it is doing and by quickly scanning or updating the state of affairs. Once these orienting responses become a habit, regular vigilance turns into a state where regular exploration becomes a new behavioural strategy: a strategy of acquiring information for its own sake. To Dennett, this transition marks a fundamental shift in the economy of organisms: it is the origin of curiosity, or epistemic hunger. Instead of gathering information only on a pay-as-you-go, use-it immediately basis, these creatures transform into informavores: organisms hungry for further information about the world they inhabit (and about themselves). Dennett remarks that, since evolution never 'invents' completely new systems, there is no such thing as 'objective' information; there is always a negative or positive editorial 'spin' involved which refers to the affectual origins of information processing.[209]

More recently, several authors (Madden, 2004; Spink, 2010) have started to explore the evolutionary origins of human's relation to information. According to information scientist Amanda Spink, information behaviour is a combination of instinctual and biologically evolved behaviour, environment influences, and lifetime development. However, only a few studies are currently available that attempt

[208] 'Entropy' is a term which has its origin in thermodynamics, more in particular in its second law where it is stated that there is a natural tendency of any isolated system to degenerate into a more disordered state. In more general terms 'entropy' is a measure of the disorder or randomness in a closed system.
[209] Summarized from Dennett (1991, pp. 178–181).

to unravel the role of information in the adaption of organisms to their environments (Madden, 2004; Mithen, 1988; Spink, 2010). Madden's view on information as "a stimulus which expands or amends the World View of the informed" (Madden, 2004, p. 9) has already been related to Boulding's concept of the *Image* in Chapter 3 but Madden's argument is also strongly embedded in an evolutionary framework. In 'Evolution and Information' (Madden, 2004) the author relates the origins of information exchange to a new situation that arose when from the perspective of evolution it became opportune to intentionally communicate information between (potential) sex partners:

> One of the consequences of the evolution of different sexes is that often, prospective mates had to evolve means of communication. With that development it became possible for animals to expand their World Views by means other than direct exploration of their environment. (Madden, 2004, p. 16)

Madden asserts here an evolutionary sequential appearance of two sources of information: 1/ direct interaction with the environment as in sensorial and ecological information; and 2/ communication of information among fellow-organisms as in intersubjective information sharing.

More closely related to our domain of interest, is work by anthropologist John E. Pfeiffer (1982; 1983) who claims that art may have played a significant role in the education and development of young members of the Upper Palaeolithic[210] groups. Music, song and dance helped children to imprint the crucial survival information contained in the myths into their memories; thereby helped by their heightened emotional states. Pfeiffer's idea – which is pragmatic and reminiscent of Cicero's views on imagination (see chapter 3) – is inspired by the fact that after two or more million years of 'sluggish' evolution in the *Homo* line, all of sudden art appeared and one of the most spectacular developments in the human story unfolded from 30,000 to 10,000 years ago. Why did people suddenly go deep into caves "to draw pictures on the walls, equipped with ground-up earth pigments, flint chisels, limestone lamps fuelled by animal fat and, presumably, scaffolding for decorating high walls and ceilings?" (Pfeiffer, 1983, p. 37). Pfeiffer claims that as supreme innovators, Homo sapiens was confronted with too much happening too fast, "too much new knowledge flowing in at an unprecedented and accelerating pace, [lead to] nothing less than a full-fledged information explosion […] the times called for something beyond the traditional methods of passing information on from generation to generation [via observation, imitation, listening]" (Pfeiffer, 1983, p. 38). Since our ancestors were still illiterate, the only way of storing knowledge was to memorize it. Pfeiffer's thesis is that without a

[210] The Upper Palaeolithic is the third and last subdivision of the Palaeolithic or Old Stone Age. Very broadly, it dates to between 50,000 and 10,000 years ago and coincides with the appearance of behavioural modernity and before the advent of agriculture. Homo sapiens are believed to have emerged about 195,000 years ago in Africa. Although these humans were modern in anatomy, their lifestyle changed very little from their contemporaries, such as Homo erectus and the Neanderthals; the Upper Palaeolithic is characterized by the appearance of a variety of artefacts in the archaeological record.

technology of writing at one's disposal, information had to be dramatized and connected to emotion for memory's sake. Cave art was the preferred medium by which information-load was addressed until it would be (partly) overruled by the invention of writing[211]. Pfeiffer concludes that:

> The explosions of information and population which began in the Upper Paleolithic are the same ones which continue to plague us today as we careen toward the 21st century. The Cro-Magnons pioneered in trying to build stable societies out of individuals with a small-band, hunter-gatherer mentality. (Pfeiffer, 1983, p. 45)

Archaeologist Steven Mithen takes up Pfeiffer's thesis in an article where he relates Upper Palaeolithic Art with information gathering (Mithen, 1988). Mithen looks in support of Pfeiffer's view to aspects of the imagery itself; for instance, in the way in which tracks, hoof prints, depict signs of vulnerability or strength. From this, Mithen concludes that Upper Palaeolithic art may be related to the cognitive development of the use of 'search' behaviour rather than the accurate and fixed depiction of reality (as Pfeiffer suggests): "art controls the development of search behaviour and selective attention by specifying which particular aspects of animal behaviour and form should be attended to if relevant information is to be gathered" (Mithen, 1988, p. 322). It is thus proposed that the role of the early art-forms is not to accurately represent reality (see *mimesis* in Plato) but rather to install a pragmatic and informational attitude how to gather that information to then utilise in decision making.

The foregoing examples indicate that investigations into the phylogenetic origins of informational behaviour are still in an early, tentative, hypothetical and exploratory phase but nevertheless show a remarkable intertwining between the fields of information and imagination. If we, in turn, take the scholarship related to the evolution of imagination as a starting-point, a similar relation can be observed.

The behavioural side of imagination is generally hard to come to grips with in a systematic way. Imagination is not observable, it is not a behaviour, it is an operation or action, hidden deep in the mind of the beholder and therefore not a preferred object of investigation for researchers who rather direct their attention to more tangible and testable concepts such as imagery and creativity. Evolutionary theory overcomes these inherent limitations by aiming at providing a functional explanation for imagination in terms of survival value. A number of functional explanations readily come to mind and have been also proposed in scholarly literature (Belsey, 2006, pp. 116–117): 1/ imagination permits humans to arrive at specific, risk-free, satisfactions for our appetites and by that also provides moments of relaxation; 2/ imagination allows us to present creatures and situations that

[211] The fact that art embodies information before the entrance of writing is an interesting point in the context of artistic research and the dialectic between the artistic and written component.

could do harm and admits taking control over the threat; 3/ imagination enables the visualization of unknown places that might be worth the effort of migration; 4/ by imagining we can empathize with fellow-humans which leads to facilitating inter-human cooperation; 5/ imagination allows for improvisation in unforeseen situations and choosing between alternative solutions; 6/ inventing new social skills and technology may rely on imagination; 7/ imagination and narrative link events in a causal sequence and provide instructive- and role models in a society (courage, pair bounding); 8/ imaginative stories provide low-cost, low-risk surrogate experience; and 9/ they can be richly instructive sources of factual information (Dutton, 2009, p. 110). In general, the advantage of imagination seems to reside in its capacity to create (better) alternatives to the world we know.

Opposing these potentially, beneficial aspects, it has also been claimed that evolution would have guarded against a capacity that creates worlds in which the rules of nature and society are broken, as in fantasy. Imagination can lead to isolated solipsism which is inherently maladaptive (Mithen, 2001, p. 51). This initial observations and indications leave us with a cluster of conflicting elements that need some more explaining and contextualising.

A crucial element is to make a distinction between imagery and imagination: "imagery typically comprises a mental representation of a state of affairs in the outside, physical world. […] Mental images typically have 'truth relationships' to the outside world" (Baron-Cohen, 2006, p. 103). Although imagery may be necessary for human imagination, it is not a sufficient condition. In this context, it has been suggested that basic imagery is to be subjected to a transformation before it can be categorized as a product of imagination (Leslie, 1987). The general (logical) framework is one in which a 'primary' and 'truthful' representation or image of the world is copied into a second-order or meta-representation which then can be manipulated and changed without jeopardizing the important truth relationships that the original representation needs to preserve for reasons of survival.[212] Here the relation between information and imagery is very prominently present, strengthening the view that their dialectical but inherently linked appearance in human history (see the previous chapter) is but a cultural manifestation of choices and hierarchies within a predetermined biological framework.

As far as the next step, from imagery into imagination is concerned, Mithen discerns in 'the evolution of imagination' (Mithen, 2001), four types of human imagination of which the origins are situated at different times in our evolutionary history.

[212] A recent publication in the field of neuro-psychology supports the assertion of an immediate (biological) link between sensorial information and imagery. Neuroscientist Daniela Dentico et al. (2014) investigated the role of bottom-up and top-down connections during visual perception and the formation of mental images. They thereby assessed the directionality of cortical signal flow during perception of movie clips versus mental replay of the movies and free visual imagery. Their analyses revealed an increased top-down signal flow during mental imagery as compared to visual perception. These results were the first direct demonstration of a reversal of the pre-dominant direction of cortical signal flow during mental imagery as compared to perception.

- Imagination in terms of thinking (perhaps unconsciously) about the consequences of different courses of action in a decision-making process is a very old type of imagination most likely shared by many types of animals. This is a primary form of imagining possible worlds; it concerns worlds that still have a strong correspondence to a real world, otherwise they would not be immediately useful in terms of survival value.
- Imagination as a capacity to think about the contents of other minds probably stretches back to the common ancestor of 5-6 million years ago, and is an essential means of maintaining the complex and large social groups of Early Humans. Humans have a 'theory of mind', an intuitive understanding of their own and other people's minds or mental states, including beliefs and thoughts (Colman, 2014).
- A next step in the evolution of imagination would be the development of imagination in the context of narration. Mithen attributes this capacity to Early Humans and their concerns with transmission of tool-making skills, the planning of big game hunting, and communication about new places and landscapes.[213] Gesture and mime may have played a critical role, here, in the absence of language: "If another individual could have simply told what he/she had seen or what was being planned, the Early Human mind may not have required such powers of imagination" (Mithen, 2001, p. 50).
- Imagination as in creating fantasy worlds where the rules of nature and society are broken is, according to Mithen, the most recent form of imagination to have evolved. Because of the danger of creating solipsistic and non-congruent individual worlds and world-images, modern humans, especially those after 50,000 years ago, learned how to overcome those evolutionary constraints by "exploiting material culture, by telling stories, and performing rituals as a means to offload and provide cognitive anchors for ideas that have no natural home within the evolved mind" (Mithen, 2001, p. 51).

It is this last step that leads to works of art and science and makes modern humans far more imaginative than all human ancestors and relatives. Key features of human imaginative behaviour include religious and ritualistic activities, production of paintings and sculpted objects, multi-component tools, and architecture. Moreover, the fact that modern humans create complex mythologies, involving supernatural beings, very early on in their existence (circa 30,000 years ago) demonstrates that they were able to conceive of entities that break the rules of nature, and that do not exist in the physical world but only in fantasy.

How was this evolutionary leap possible in a technical sense? Mithen provides an appealing answer in *The Prehistory of the Mind* (Mithen, 1996) where he asserts that modern humans were able to integrate bodies of knowledge and ways of thinking that had evolved in, and previously been restricted to, quite different and separate cognitive domains. Mithen identifies three such domains: 1/ intuitive psychology (social intelligence)[214] for managing the complex social world in which hominids lived; 2/

[213] Early Humans are to be situated in a period between 1.8 million and 300,000 years ago and were the first of our ancestors to disperse from Africa. Some of the landscapes they eventually occupied were quite different from the African savannah (Mithen, 2001, p. 40).

[214] The alternative terms between brackets are used in *The Singing Neanderthals* (Mithen, 2005, p. 264).

intuitive biology (natural history intelligence) for understanding animals and plants, the weather and the season, and aspects of the natural world essential for a hunter-gatherer lifestyle; and 3/ intuitive physics (technical intelligence) which enables the complex manipulation of artefacts and especially the production of tools. What Homo sapiens added to this multiple intelligences principle is one additional key feature: 'cognitive fluidity' or "the capacity to integrate ways of thinking and store knowledge from separate intelligences so as to create types of thoughts that could never have existed within a domain-specific mind" (Mithen, 2005, pp. 263–264).

Cognitive fluidity evolved as a consequence of language and the capacity for analogy and metaphor: "spoken and imaginary utterances acted as the conduits for ideas and information [own emphasis] to flow from one separate intelligence to another" (Mithen, 2005, pp. 264). In evolutionary terms, cognitive fluidity and the appearance of fantastic imagination means that the rules of nature encoded into the human mind were overridden by a form of mutation allowing new patterns of neural networks in the brains of modern humans. Parts of the brain dealing with specific and isolated knowledge became entwined and led to completely new types of thoughts, behaviours and objects as evidenced by carvings and traces of ritual behaviour. The problem of solipsism in human thinking was overcome by the creation of objects of art, paintings, rituals who arose in support of this mutation. In *the Art Instinct* (2009), philosopher Denis Dutton (1944-2010) seconds the value and the role of art in allowing intersubjective communication and to experience something of another's mind: "the work of art is another human mind incarnate: not in flesh and blood but in sounds, words or colours" (Dutton, 2009, p. 235). They represent not only the products of a new way of thinking, but are also their primary source. We can individually come up with all kinds of fantasies but describing it to fellow-humans or recalling it the next day is not evident, unless these newly forged images are offloaded from the mind in to the physical world.[215] Offloading these ideas and imaginations from the mind into the physical world by means of pictures or notes alleviate the burden on memory and these public images act as a cognitive anchor that could be recalled, manipulated, and shared. In this regard, the imaginative brains of modern humans may not, in itself, have greater powers of imagination than that of its immediate predecessors (Neanderthals); they simply exploit the world outside of the skull to augment its powers of creative thought (Mithen, 2001, p. 50).

Summarizing this co-evolutionary story of imagination and information behaviour we can come to the framework presented in Fig. 4.1 which also integrates elements from Chapter 3. Humans 1, 2 and 3, all possess individual images of the world and the self; these images are based on an informational

[215] Mithen contrasts these phantasies with gossiping: "[gossip] is always easy to remember and to pass on. This is because it engages with a part of our evolved psychology- the ideas in gossip are exactly the types of ideas our minds have evolved to deal with" (Mithen, 2001, p. 49).

input that connects them to the physical, biological and cultural world and rely on the passive (Voltaire) or primary (Coleridge) imagination for their ultimate construction. Humans 1,2 and 3 have direct links to each other by sharing certain pre-dispositions (psychology, biology, physics) that allow for the development of a *Theory of Mind*[216] and for assuming certain shared orientations in life. Some aspects however are idiosyncratic and individually acquired and can only be shared if the active or secondary imagination enters the phase of creation and adds its products (language, stories, theories, art, performance, behaviour) to a phenomenological and perceivable world.

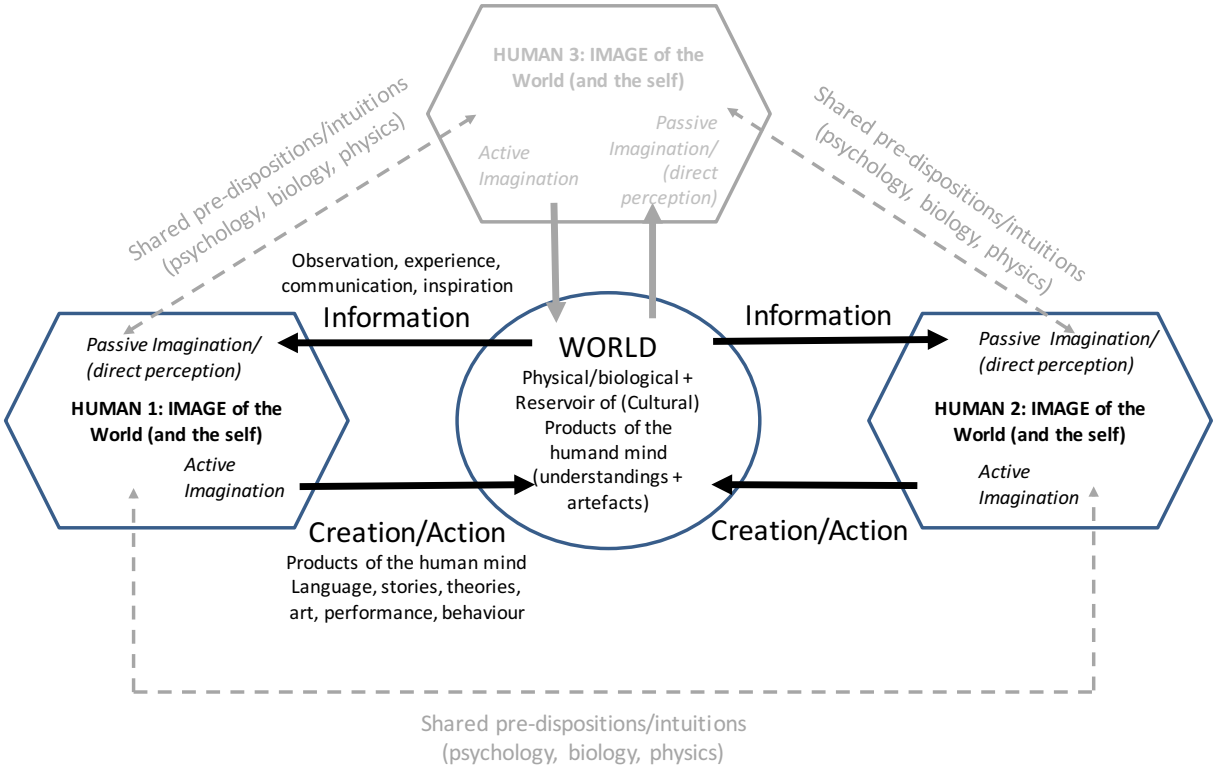


Figure 4.1. The alliance between information and imagination.

We find here an intrinsic alliance between information and imagination akin to the one we observed in the terminological genealogy of the first chapter.

## 4.2 Two developmental approaches

Developmental (ontogenetic) theories are at times linked to the evolutionary (phylogenetic) approaches by biologist Ernst Haeckel's phrase "ontogeny recapitulates phylogeny"; it is a largely discredited biological hypothesis which holds that the development an animal, from fertilization to gestation, goes through stages resembling successive phases in the ancestral evolution of the animal.

[216] For a tentative relation between *Theory of Mind* and music see Livingstone & Thompson (2009).

Our aim is not to forge such a link here but rather to focus on two seminal figures in the field of developmental theory and represent and assess their respective views on the information-imagination dialectic.

Freud already illuminated certain developmental aspects with regard to imagination and knowledge and the balance between them (see the previous chapter). He concluded that imagination comes to fruition in adult life when child play starts to receive inhibitory constraints via its link to an inescapable reality (the reality-principle). Psychologists Jean Piaget (1896-1980) and Lev Vygotsky (1886-1934) both offer more in-depth analyses of this developmental balance. Remarkable is that the outcome of their enquiries is to a large extent conflicting with regard to the aspect-ratio between information and imagination (Archambault & Venet, 2007).

According to Piaget the child inhabits from birth an illusory world and gives it meaning via the egocentric pleasure principle; imagination is a tool that overcomes the lack of knowledge that children have with regard to the world that surrounds them (especially between 2-7 years). Eventually, imagination loses its grip at the moment when the child leaves this illusory world for a realistic one and trades the egocentric view for more useful formal and logical thinking. As a temporary tool that does not contribute to an understanding of the real world, imagination is from a Freudian point of view a marginal element of ontogenetic development.

Vygotsky on the other hand situates the young child not in a fictional and egocentric world but in a real, intersubjective one that provides essential elements for the child's primary needs and one that has to be explored by the child in order to become an autonomous, free and creative human being. Vygotsky insists on the capacity of the human being to free itself from the real and to create via imagination something new. Piaget and Vygotsky both acknowledge the existence of rational thinking and imagination, but for Vygotsky a total fusion and integration between the two forms of thinking through an immersion in reality cannot be reached in lifetime. Imagination belongs to the crucial superior mental functions (such as memory, will, verbal thinking) and has the disconnection with reality as one of its crucial preconditions:

> Imagination and creativity connected with free processing of elements of experience and with their free combination absolutely require as a precursor the internal freedom of thinking, action, and cognition that can be attained only by one who has already mastered the formation of concepts. Not without reason do imagination and creativity drop to zero with the disturbance of this function. (Vygotsky, 1998, p. 153)

Since imagination and creation are related to reality by recombining elements of experience, a logical consequence is that they become more interesting as the materials acquired by lived experience accumulate and that capacity for creation increases through lifetime.

For a better understanding of the striking opposition between Piaget and Vygotsky on the information-imagination we must go back into the theoretical underpinnings for their points of view.

According to Piaget (Piaget, 1945; 1951), cognitive development occurs through the interaction between the individual and the environment, based on the individual's perception or cognitive (thought-related) construction of the environment. The main emphasis in this interaction lies in the individual's interpretation and understanding of the environment based on his own knowledge and experiences. Piaget thinks that this cognitive development occurs in phases, and that these phases follow a fixed order for all human beings. Cognitive development occurs when the child gradually adapts to the environment (*adaptation*), either by interpreting the situation on the basis of personal knowledge and experiences (*assimilation*) or by absorbing new experiences and reorganizing (changing, adjusting) cognitive opinion (*accommodation*).

Within this framework, new learning occurs because accommodation makes it necessary to change the former categories of understanding – accommodation comes close here to the role of information that we discussed in the context of activity- and Image-based approaches to information. Piaget emphasizes however that assimilation and accommodation are two processes that complement each other and change their inter-intensity in relation to an *equilibrium* principle. Within this generally applicable description of a child's thought development imagination, imitation, play, and intelligence are related to each other (Piaget, 1945/1951, p. x): 1/ genuine intellectual development occurs in a context where assimilation is closely linked to accommodation (in an exchange); 2/ if assimilation gets primacy on accommodation symbolic play and creative imagination are stimulated; and 3/ reproductive imagination and representative imitation are connected to a situation where accommodation is granted primacy over assimilation, hence imitation is when the child practices an action pattern by adapting (or accommodating) him- or herself to an external model. Here the factor of *mimesis* (reproductive imagination) is revisited in the context of intellectual development and implicitly favoured over mere creative play (creative imagination) which practices an action pattern solely for the satisfaction that lies in the feelings of mastery based on previous experience. Piaget reconnects hereby with the creation myths of the first life where the demiurge creates a world according to a model [*παραδείγμα*] and to Kant's process of *Nachahmung* as a possibility for learning artistic rules. Although, to Piaget, both play and imitation are fundamental for the general, intellectual development – imitation can become play, and vice versa – play emphasizes the child's own world, while imitation forges a connection with reality. When this connection is strengthened in the course of ontogenetic development, creative imagination becomes simply superfluous, according to Piaget.

The framework that Vygotsky develops with regard to psychological development is socio-constructivist and does not posit universal stages of intrinsic, ontogenetic maturation. Vygotsky believes that learning should always precede growth via a *zone of proximal development*, which is the central concept in Vygotsky's thinking. According to Vygotsky, a child is able to learn skills or aspects of a skill that go beyond the child's actual developmental or maturational level through the assistance of a more capable person. Individual development is about social interaction which allows the child to acquire instruments that have been developed by former generations. The development of imagination, as a superior mental function, depends on these social interactions in order to grow from a subjective understanding into an objective one (Archambault & Venet, 2007, p. 13). Like Piaget, Vygotsky also uses the concepts of creative and reproductive imagination but values them inversely: "one type of activity we could call reproductive, and is very closely linked to memory; essentially it consists of a person's reproducing or repeating previously developed and mastered behavioural patterns or resurrecting traces of earlier impressions" (Vygotsky, 1930/2004, p. 7); another type is the one of creative or combinatorial behaviour/imagination and it includes "activity that results not in the reproduction of previously experienced impressions or actions but in the creation of new images or actions" (Vygotsky, 1930/2004, p. 9). In order to account for the combinatorial aspect, Vygotsky proposes three consecutive phases: 1/ perception and accumulation of experience; 2/ dissociation (as the breaking up of a complex whole into individual parts); and 3/ a process of change/distortion/transformation based on the dynamic nature of our internal neural stimulation and the images that correspond to them.

> The traces of external impressions are not laid down inalterably in our brain like objects in the bottom of a basket. These traces are actually processes, they move, change, live, and die, and this dynamism guarantees that they will change under the influence of imagination. (Vygotsky, 1930/2004, p. 26)

Vygotsky further elevates imagination from its link to untruthfulness by stating that:

> In everyday life, fantasy or imagination refer to what is not actually true, what does not correspond to reality, and what, thus, could not have any serious practical significance. But in actuality, imagination, as the basis of all creative activity, is an important component of absolutely all aspects of cultural life, enabling artistic, scientific, and technical creation alike. In this sense, absolutely everything around us that was created by the hand of man, the entire world of human culture, as distinct from the world of nature, all this is the product of human imagination and of creation based on this imagination. (Vygotsky, 1930/2004, p. 9)

Here Vygotsky points to the value of imagination in the real world whereas Piaget opposes the field of imagination to that of reality. Vygotsky makes the relation between the two domains more concrete by proposing four essential associations:

- "The first type of association between imagination and reality stems from the fact that everything the imagination creates is always based on elements taken from reality, from a person's previous experience". Vygtosky counters the view of a *creatio ex nihilo* and invokes scientific analysis to argue that "the most fantastic creations are nothing other than a new combination of elements that have ultimately been extracted from reality and have simply undergone the transformational or distorting action of our imagination" (Vygotsky, 1930/2004, p. 13).
- A second link concerns the association between the final product of imagination and a complex real phenomenon. This product, the combination of elements based on experience of reality, sometimes corresponds to real phenomena such as a desert or the French Revolution [Vygotsky's examples]. In those cases, "[imagination] becomes the means by which a person's experience is broadened, because (s)he can imagine what he has not seen, can conceptualize something from another person's narration and description of what he himself has never directly experienced. He is not limited to the narrow circle and narrow boundaries of his own experience but can venture far beyond these boundaries, assimilating, with the help of his imagination someone else's historical or social experience" (Vygotsky, 1930/2004, p. 17).
- Imagination creates illusory situations that elicit non-illusory, real emotions. Vygotsky presents music as the ultimate example: "Frequently, a simple combination of external impressions, such as a musical composition, induce a whole complex world of experiences and feelings in a person listening to the music. This expansion and deepening of feelings, their creative restructuring constitutes the psychological basis for the art of music" (Vygotsky, 1930/2004, p. 17).
- The essence of a fourth type of association between imagination and reality is that "a construct of fantasy may represent something substantially new, never encountered before in human experience and without correspondence to any object that actually exists in reality; however, once it has been externally embodied, that is, has been given material form, this crystallized imagination that has become an object begins to actually exist in the real world, to affect other things. In this way imagination becomes reality" (Vygotsky, 1930/2004, p. 17).

From this brief discussion of two seminal sources, it can be inferred that the relation between imagination and information coming from the real world, are differentially looked upon by these two developmental psychologists. Piaget posits a relation where knowledge and information about reality gradually take over the child's world of imagination, while Vygotsky sketches parallel increasing courses of development where imagination is enriched by a surplus of informational experience. It is an ontogenetic dialectic that resonates with the historical journey of information and imagination as we presented it in Chapter 3 and conforms either antagonistically of sympathetically with the phylogenetic development that we sketched previously in this chapter.

Mathematician Marcus Du Sautoy summarizes this essential complementarity between factual information and imaginative speculation by paraphrasing Wittgenstein[217]: "Whereof we cannot know, there our imaginations can play"(Du Sautoy, 2016, pp. 513–514).

In the next chapter-section we aim at focussing, again from a generic perspective, on the actual role of information in the daily life of Homo sapiens in our times.

## 4.3 Dealing with information in everyday life

### *4.3.1 The paradox of information*

Although, in our times, information is omnipresent and -available in its modern guise as communicator of factual and disembodied knowledge, journalist and author Elizabeth Kolbert wonders in a recent review article why some of or beliefs and opinions seem to be immune to the impact of factual information (Kolbert, 2017). In *Novum Organum*, Francis Bacon already points to this phenomenon by observing that "once a man's understanding has settled on something (either because it is an accepted belief or because it pleases him), it draws everything else also to support and agree with it" [F. Bacon, *Novum Organum*, bk.I, XLVI] (Bacon, 1620/2000, p. 43). Social psychologists in the second half of the 20th century refer to this phenomenon either as *belief perseverance* or "the tendency to cling to one's initial belief even after receiving new information that contradicts or disconfirms the basis of that belief" (Baumeister & Vohs, 2007, p. 109)[218]; *confirmation bias* or "processing information by looking for, or interpreting, information that is consistent with one's existing beliefs" (Baumeister & Vohs, 2007, p. 162); or *my-side bias* where people are able to generate and remember more reasons supporting their side of a controversial issue than the opposing side (Baumeister & Vohs, 2007, p. 163). General explanations for human's susceptibility to hold on to existing beliefs and opinions include the protection and individual claims to intelligence; above all, however, ignoring factual information is one of the human ways to process information efficiently and cost-friendly.

> Humans are bombarded with information in the social world and cannot possibly take the time to carefully process each piece of information to form an unbiased conclusion. Human decision making and information processing is often biased because people are limited to interpreting information from their own viewpoint. People need to process information quickly to protect themselves from harm. It is adaptive to rely on instinctive, automatic reflexes that keep humans out of harm's way. (Baumeister & Vohs, 2007, p. 162)

[217] Wittgenstein concluded his *Tractatus Logico-Philosophicus* with the famous line: "Whereof one cannot speak, thereof one must be silent".

[218] For the seminal experiments with regard to perseverance of belief see Ross, Lepper & Hubbard (1975) and Anderson, Lepper & Ross (1980).

In three recent publications, the perseverance of first impressions and tendency to select information that corroborates existing beliefs and opinions are revisited and subjected to further scrutiny.

In *The Enigma of Reason*, cognitive scientists Hugo Mercier and Dan Sperber focus on the evolution of reason and argue that reasoning did not develop in order to solve abstract, logical problems or to help draw conclusions from unfamiliar data, but rather to resolve the problems arising from the life in collaborative groups; habits of mind that seem implausible from an analytical point of view may prove to be very useful when considered from the perspective of social and collaborative interaction. A primary observation in this context is that although humans are quite adept at spotting the weaknesses in other people's arguments, they are almost invariably blind about their own incongruences. Presented with someone else's argument, we are quite adept at spotting the weaknesses. Almost invariably, the positions we are blind about are our own. This lop-sidedness, according to Mercier and Sperber, reflects the task that reason evolved to perform, which on the one hand is to prevent us from being misinformed by the other members of our group and potentially risk one's life based on that information, and on the other hand, to devise and evaluate arguments intended to protect social standing and life security.

In *The Knowledge Illusion: Why We Never Think Alone* (Sloman & Fernbach, 2017), cognitive scientists Steven Sloman and Philip Fernbach also point to sociability as the key to human functioning. From experiments were graduate students are asked to rate their understanding of everyday devices (including toilets, zippers, and cylinder locks), the authors induce that people believe that they know way more than they actually do. According to the authors, humans have a general tendency to maintain an unrealistic confidence in their own knowing due to their trust and belief in other people's expertise.

> There has always been what cognitive scientists like to call a division of cognitive labour. From the beginning of civilization, people have developed distinctive expertise within their group, clan, or society. They have become the local expert on agriculture, medicine, manufacturing, navigating, music, storytelling, cooking, hunting, fighting, or one of many other specialties. One individual may have some expertise in more than one skill, perhaps several, but never all, and never in every aspect of anyone thing. No chef can cook all dishes. Though some are mighty impressive, no musician can play every instrument or every type of music. No one has ever been able to do everything. (Sloman & Fernbach, 2017, p. 14)

Therefore, according to the authors, it is not surprising that we can hardly tell where our own understanding ends and others begins; there seems to be no sharp boundary between one person's ideas in knowledge and those of other members of the group. According to the authors again, this element of human functioning has been crucial and empowering to innovation, progress and

invention; it allows humans to build on the work of fellow-humans. However, this dependence on other minds gets dangerous when applied to the political domain where citizens are inclined to define their positions without being able to foresee the differential impacts of implementing a range of political ideas. Since people ratchet down the intensity of their views once they are confronted with their quasi-cluelessness with regard to the implications of certain decisions, Sloman and Fernbach see in this a remedy to the illusion of explanatory depth and a tool to change people attitudes. In all of this, the authors do not make a plea for more information, rather instead of putting all the weight of a decision on the individual and educating him/her to make wise decisions, efforts should go a type of decision-making that is supported by a community of knowledge and evaluated though personal and pragmatic assessment.

> We're not championing faith in whatever a community believes or whatever a credentialed expert says. Along with faith must come a healthy dose of skepticism and a keen eye for charlatans and those who are confidently wrong. (Sloman & Fernbach, 2017, p. 260)

Finally, in *Denying to the Grave: Why We Ignore the Facts That Will Save Us* (Gorman & Gorman, 2017), Jack Gorman, a psychiatrist, and his daughter, Sara, a public-health specialist, present a theory of health science denial or why we ignore proven scientific evidence and put ourselves at risk for instance by holding on to the conviction that vaccines are hazardous. The Gormans argue that ways of self-destructive fact denial must at some point have been adaptive. They thereby point to the physiological component of confirmation bias and cite research which suggests that people experience genuine pleasure — a rush of dopamine — when processing information that supports their beliefs (Gorman & Gorman, 2017, pp. 134–136). Providing people with accurate information ("just giving the facts") is according to the authors not an effective method to disarm destructive beliefs, people simply discount it. Throughout the book the authors argue that there are complex psychological, social, and neurobiological underpinnings of resistance to scientific evidence and that many of these tendencies are completely adaptive, healthy, and essentially human. The challenge that remains is to figure out how to address the tendencies that lead to false scientific belief without completely repressing them. The Gormans propose a multipronged approach that guides people toward the evidence without dismissing the importance of their human emotions.

These three recent reference-texts point to a deeply ingrained paradox in the human relation to information: although our society invests a great deal in the production of factual knowledge, the information that can be deduced from it is not always reaching its target domain. In these examples, imagination is not the challenging counter-factor or resisting factor to information, but rather the habits and beliefs that people rely on in everyday life (their *Images* as we saw in Chapter 3). The

building blocks that support the defence against new information are the power of first impressions, the drive to convince others of the blind confidence in the specific expertise of fellow-humans, and the joy one finds in finding evidential confirmation. These empirical findings are on a par with the observations that came from the discourse analysis in Chapter 2: the integration of information in existing practices is not so much a matter rational and boring accountancy but rather an energy-demanding challenge, a courageous act of rebellion against a very powerful, ingrained, and natural disposition to hold on to the *status quo,* especially if it concerns extra-disciplinary and counter-intuitive information.

### *4.3.2 'Information Behaviour Research'*

A more detailed analysis of information searching and handling is provided by Information Behaviour Research [IBR] which arose as a sub-discipline in the mid- and late 1990s from a cluster of theoretical activity within library and information science: librarians wanted to understand library users better, government agencies were interested to understand how information flow could contribute to innovation, and social scientists generally were interested in the social uses of information (Bates, 2010a). The label 'information behaviour'[219] is in fact a *non sequitur*, information does not behave, but it is nevertheless the most commonly used term today and replaces older terms such as 'user studies' and 'information seeking & gathering'. Ted Wilson, one of the founding fathers of the discipline, delineates the contours of information behaviour as follows:

> Information Behaviour is the totality of human behaviour in relation to sources and channels of information, including both active and passive information seeking, and information use. Thus, it includes face-to-face communication with others, as well as the passive reception of information as in, for example, watching TV advertisements, without any intention to act on the information given. (Wilson, 2000, p. 49)

Wilson's definition is intended to cover a broad range of activities: it entails intentional and purposeful ('active') behaviours as well as unintentional or serendipitous ('passive') ones such as glimpsing or encountering information (Case & Given, 2016), and explicitly and implicitly, the main subfields in 'information behaviour' as a discipline are represented: information needs, information seeking and information use.

The vocabulary varies from one author to another but the general picture is one wherein these three subareas are supposed to be operational in a 'universe of knowledge' (Wilson, 1981) where a dynamic interaction among three components occurs: the information user; the information (or knowledge)

[219] Since the study of information behaviour has strong roots in American scholarship, the term is most frequently in its U.S. spelling 'behavior'. Since our main text maintains a British-English spelling, the spelling, also within citations, will be adjusted accordingly.

resource; and the intermediary mechanism (also called information system) which is situated between the first two components (see Fig. 4.2).

The *user* initiates the system because of some problems, goals or intentions that do not find a satisfying answer within the own reference group or 'user's life world' (Wilson, 1981) and of which it is believed that its management or realization might be furthered by information obtained from an (external) information resource. In sociology, the spheres that envelop the information user would be called a 'practice' or a 'reservoir of personal repertoires', where 'repertoire' refers to the set of strategies and their analogic potential that any one individual possesses, and 'reservoir' to the total of sets and its potential to the community (Bernstein, 2000, p. 158).

The *information resource* is made up of structures of texts which are capable of changing the recipient (Belkin & Robertson, 1976; Belkin, 1984). In this context, a text is meant as "a collection of signs purposefully structured by a sender with the intention of changing the image-structure of a recipient" (Belkin & Robertson, 1976, p. 201).[220] The intermediary *information system* negotiates between the user's desires, requirements, knowledge and the knowledge resource's contents, representation and organization, so that, if texts appropriate to the user's situation are in the information resource, they (or aspects of them) are brought to the user's attention (Belkin, 1984).

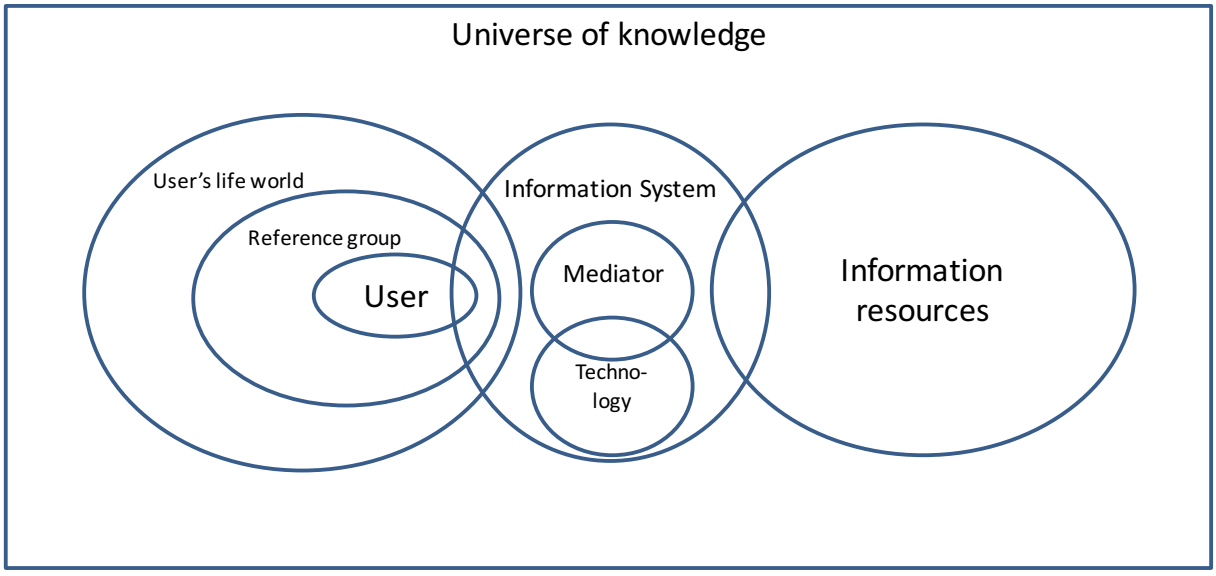


Figure 4.2. The domains involved information seeking (after Wilson, 1981).

[220] This particular formulation dates from the late 1970s, when part of the field was still called 'information science'. The notion of 'text' coupled with 'intentionality' is meant to exclude biological information and perceptual information. Belkin (Belkin & Robertson, 1976) in fact uses the term a 'knowledge resource' which contains information. Subsequent models will prefer the term 'information resource' and define 'information' as to cover "all instances where people interact with their environment in any such way that leaves some impression on them—that is, adds or changes their knowledge store" (Bates, 2010b).

The overall challenge of information behaviour studies is to understand the cognitive models or images that the main components of the system have of one another and of themselves. Within that context, a 'person-centred' and qualitative approach rather than a 'system-centred', 'resource-centred' and quantitative approach has taken over since the 1980s. Researchers became aware of the fact that to address the user's problem and to promote communication between the system and the user, an image or model of the user is needed as well as an image or model of the texts represented in the system. In information behaviour studies, a description of this information user generally incorporates a complex interplay between three dimensions of activity: a physical (actual actions taken within a particular situation); an affective (feelings experienced); and a cognitive dimension (thoughts concerning both process and content) (Kuhlthau, 1991, p. 352).

From this very short introduction, it can be summarized that IBR generally involve three actors (user, system, resource), three dimensions (situational, affective, cognitive) and three (predominantly unidirectional) processual stages (information need, information seeking, information using). We will have a closer look at these three stages and their characteristics to enlighten our vision on how information actually works.

#### *4.3.2.1 Information needs*

Aristotle opens his *Metaphysics* with a seminal statement: "all men by nature desire to know [*πάντες ἄνθρωποι τοῦ εἰδέναι ὀρέγονται φύσει*]"[221] (Aristotle, 2006, p. 3) and bases this assertion on the fact that humans take pleasure in their senses (which could qualify as sensorial information). It is remarkable how the remainder of Aristotle's first paragraph in the *Metaphysics* anticipates Bateson's definition of information (information as a difference that makes a difference) and blends it with Wilson's perspective on information behaviour[222]. Aristotle claims:

> For not only with a view to action, but even when we are not going to do anything, we prefer seeing (one might say) to everything else. The reason is that this, most of all the senses, makes us know and brings to light many differences [*διαφοράς*] between things. [Arist. *Metaphysica*, Book I] (Aristotle, 2006)

Aristotle's observation and those of others (see 4.1.) which indicate a certain fundamental and biological ingrained need for information have been a longstanding issue of debate among

[221] The text in Greek is provided by http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0051%3Abook%3D1%3Asection%3D980a.

[222] There is no explicit link in both authors to Aristotle, and (to my knowledge) not in the literature that deals with information-issues.

philosophers, psychologists, educationalists and therapists (Case & Given, 2016, pp. 78–79). It is for instance common knowledge that sensory deprivation can have detrimental effects on human's well-being; on the other hand, therapies, such as Restricted Environmental Stimulation Therapy (REST), show that being cut off from sensorial information (for a while) has a relaxing and benign effect.

In an attempt to come to grips with the concept of information needs, Wilson (1981) differentiates between three interrelated categories of primary needs: 1/ physiological needs, such as the need for food, water, shelter etc.; 2/ affective needs such as the need for attainment or for domination; and 3/ cognitive needs, such as the need to plan or to learn a skill. Viewing information from this perspective, Wilson does not grant information the status of primary need (such as the need for shelter or the need for sustenance) but rather a secondary order need which follows from the desire to satisfy primary needs (Wilson, 2000, p. 51).

In a similar way, library scientist Petros Kostagiolas et al. (2016) draw a line between 'information motives' and 'information needs': the occupational, socio-cultural, politico-economic and physical environment create certain motivations (primary needs) that engender information needs (secondary needs). From a less theoretical but more practical perspective (experience of healthcare practitioners), health scientist Wies Weijts et al. (1993) differentiate within the cluster of information needs between 1/ needs for new information; 2/ needs to elucidate the information held; and 3/ needs to confirm information held. Wilson (2000) comments with regard to the formulation of 'information held', that it is not the information that needs elucidation but rather the values and beliefs present in the subjects that are at stake; this is congruent with Boulding's use of the *Image* and with the distinction between information and knowledge that we articulated before.

One of the theoretical models that aims at encapsulating the various taxonomical efforts into a processual framework is communication and information scholar Brenda Dervin's 'sense-making' metaphor by which she describes how humans perceive information needs as 'cognitive gaps' (Dervin, 1992). Dervin pictures humans as moving through space and time, and as long as individuals are able to make sense of their experiences, movement ahead is possible. However, from time to time, forward movement is blocked by the encounter of a 'cognitive gap', a situation in which the ability to make sense has run out. An information need has arisen in order to bridge this gap, people seek information to construe a new sense and use this information to help them continue on in their journey. Dervin differentiates between five situations in which these gaps and information needs occur:

> The decision stop, where the human sees two or more roads ahead; the barrier stop, where the human sees one road ahead but something or someone stands on the road blocking the way; the spin-out stop, where the human sees self as having no road; the wash-out stop, where

> the human sees self as on a road that suddenly disappears; the problematic stop, where the human sees self as being dragged down a road not of his/her own choosing. (Dervin, 1992)

Educator and library scientist Carol Kuhlthau links cognitive gaps to affective states by observing that in a situation where a cognitive gap arises, a state of uncertainty may be created. Kuhlthau formulates her 'uncertainty principle' as follows:

> Uncertainty is a cognitive state that commonly causes affective symptoms of anxiety and lack of confidence. Uncertainty and anxiety can be expected in the early stages of the information search process. The affective symptoms of uncertainty, confusion, and frustration are associated with vague, unclear thoughts about a topic or question. As knowledge states shift to more clearly focused thought, a parallel shift, occurs in feelings of increased confidence, Uncertainty due to a lack of understanding, a gap in meaning, or a limited construction initiates the process of information seeking. (Kuhlthau, 2004, p. 92)

Without any clear reference to it, Kuhlthau is here on the same page as pragmatist philosopher John Dewey in his book *the Quest for Certainty* which opens with: "Man who lives in a world of hazards is compelled to seek for security" (Dewey, 1929, p. 3), and examines how people deal with uncertainty by changing the world through action (practice) and by changing the self in emotion and idea (theory). The search for security is also present in psychologist Abraham Maslow's well-known 'hierarchy of needs'[223]. In 'the need no know and the fear of knowing' (Maslow, 1963), Maslow advances the thesis that we do have an instinctive need to know (and hence a need for information), but that it must be integrated with a fear of knowing, with anxiety, with needs for safety and security: "we can seek knowledge in order to reduce anxiety and we can also avoid knowing in order to reduce anxiety" (Maslow, 1963, p. 122); sometimes we would rather not know that we are at high risk for a disease or natural disaster. Within this context, information is perceived rather as a causal factor of anxiety and dysfunction than as a solution to it. The idea that information can cause anxiety and dysfunction is discussed in psycho-dynamic theories and refers to the insight that "we protect ourselves and our ideal image of ourselves by repression and similar defences, which are essentially techniques by which we avoid becoming conscious of unpleasant or dangerous truths" (Maslow, 1963, p. 118).[224]

#### *4.3.2.2 Information seeking*

The experiencing of an information need does not always lead to purposive *information seeking*.[225] There is not only the aspect of information anxiety (Maslow, 1963, p. 122); people may also rely on

[223] 'basic needs' (physiological + safety); 'psychological needs' (belonging/love + esteem); 'self-fulfillment needs' (self-actualization).

[224] We already discussed the reluctance to integrate information that is potentially incompatible with existing opinions and beliefs in section 4.3.1.

[225] Next to active or purposive behaviours, unintentional or serendipitous behaviours such as glimpsing or encountering information are also part of the field of information behaviour (Case & Given, 2016).

their own memory or intuition to meet the information need; they may start a trial-and-error procedure; they can take decisions with incomplete information or on the basis of beliefs and prejudices (see 4.3.1.); or they may also suppress their information needs or avoid a problem situation so that no information seeking is necessary (Choo, Detlor, & Turnbull, 2000, p. 8). An active and purposive phase of information seeking is only one of many options. Even if an information need seems amenable to be prolonged in an active and purposive stage of information seeking, still several factors other than the existence of a need may intervene in the process. Wilson (1981) mentions personal, interpersonal and environmental barriers including elements such as the importance of satisfying the need, the penalty incurred by acting in the absence of full information, the availability of information sources and the costs of using them.

Purposive information seeking then, once activated, is directed towards solving a problem, making a decision, or increasing understanding and in a very general sense, the information seeker identifies possible sources of information, differentiates and chooses between them, makes contact with them, and interacts with the sources to obtain the desired information. Wilson (1981), summarizes with this definition:

> Information Seeking Behaviour is the purposive seeking for information as a consequence of a need to satisfy some goal. In the course of seeking, the individual may interact with manual information systems (such as a newspaper or a library), or with computer-based systems (such as the World Wide Web). (Wilson, 2000, p. 49)

Let us briefly introduce some of the essential concepts and vocabulary that appear in four information seeking models developed by four influential information scholars.

Most known is probably Bates' 'berrypicking'-metaphor (Bates, 1989) which challenges the previous generally assumed idea of matching a single query via a database to a single output set. Bates claims that information seekers may begin with just one feature of a broader topic and encounter with each new piece of information new ideas and directions to follow and, consequently, a new conception of the query. At each stage the search terms used in order to get a better match for a single query are not merely modified, rather the query itself (as well as the search terms used) is continually shifting. This type of research is labelled by Bates as 'evolving search'. This type of research implies that a single query is not linked to a single set of information but by bits of information at each stage of the search.

> A bit-at-a-time retrieval of this sort is here called berrypicking. This term is used by analogy to picking huckleberries or blueberries in the forest. The berries are scattered on the bushes; they do not come in bunches. One must pick them one at a time." (Bates, 1989)

A second model, 'Information foraging theory' (Pirolli, 2007), can be considered as a spin-off concept, generated by the informavore-metaphor. The theory first emerged in ecological studies to explain the way organisms optimize the amount of energy they can take in through foraging of food resources. In the case of a predator for example: how much effort is invested in stalking and chasing a specific prey and how much energy can be gained from eating it? Optimal foraging then is about getting the highest amount of benefit whilst expending the lowest amount of energy through the structuring of environments and the selection of appropriate strategies. In today's information galaxy, source selection is of vital importance taking into account the limits on human attention and processing capacity. The information foraging model predicts that deciding between sources is a trade off between amount of effort required to use a source against the anticipated usefulness of the information gained from that source. 'Perceived source quality', 'relevance' and 'reliability' are the key words here. Next to these rules of economy these decisions are also modulated by personal interest and motivation and by situational elements such as the complexity of the problem or challenge. The key concepts to emerge from this analogy are:

- Information: The item of information that is sought or found and the value it has in fulfilling the information need;
- Information patches: The temporal and spatial environments in which information is clustered;
- Information scents: The determination of information value based on proximal navigation cues and metadata;
- Information diet: The decision making to decide whether or not to select and pursue an information item.

In a third model information behaviour researcher David Ellis (1989) provides a frequently used, systematic vocabulary by describing six characteristics that are implied in the information seeking (Ellis, 1989, p. 238):

1. Starting: activities characteristic of the initial search for information.
2. Chaining: following chains of citations or other forms of referential connection between material.
3. Browsing: semi-directed searching in an area of potential interest.
4. Differentiating: using differences between sources as a filter on the nature and quality of the material examined.
5. Monitoring: maintaining awareness of developments in a field through the monitoring of particular sources.
6. Extracting: systematically working through a particular source to identify material of interest.

Building on the principle of uncertainty (as discussed under 'information needs'), Kuhlthau (2004) finally examines the affective dimensions of information seeking and postulates that information search is composed of six stages that are characterized by different emotional responses: 1/ during

*initiation*, thoughts and discussions centre on contemplating the problem and relating it to prior experience and knowledge. Feelings of uncertainty and apprehension are common in this stage; 2/ during *selection*, the user typically confers with others and makes a preliminary search of information available in order to identify the general area or topic to be investigated and the approach to be pursued. Feelings of uncertainty evolve into an optimism and a readiness to search; unless of course selection is delayed or postponed; 3/ during *exploration*, the user expands personal understanding of the general area. Becoming oriented and sufficiently informed about the topic gradually leads to a personal focus. Feelings of confusion and doubt may increase since the information encountered rarely fits perfectly with previously-held constructs and inconsistency and incompatibility between sources may be encountered; 4/ *Formulation* is the turning point of the process in which the user establishes a focus or theme on the problem that can guide searching (akin to the forming of a hypothesis). Feelings of uncertainty diminish as confidence and as sense of clarity increases; 5/ *Collection* is the stage where the focus is further defined, extended and supported by making detailed notes on relevant issues and interacting with libraries and other information systems. Confidence increases and interest in the project deepens; and 6/ In the final stage of *presentation*, the user completes the search and makes a personalized synthesis of the topic. There is a sense of relief, accompanied by satisfaction if the search is thought to have gone well, or disappointment otherwise (Kuhlthau, 2004, pp. 165–166).

Again, Kuhlthau's ideal course of events is not the only scenario possible. In the process of information seeking, one can get stuck in one of the phases and an information overload can increase feelings of uncertainty and anxiety. Information scientist Constance A. Mellon (2015) describes the phenomenon of information phobia and anxiety and reports how university students feel scared, overpowered, lost, and confused in their confrontation with libraries. There's little known about the failure-rate of information seeking and its relation to this kind of heightened anxiety. In his most recent survey Case reckons that there are probably a great many of failures: "it is easy to imagine calling a halt to an information search when one is faced with an overwhelming number of information sources and an uncertainty about their relative quality" (Case & Given, 2016, p. 119).

#### *4.3.2.3 Information use*

The final stage to be considered in IBR is *information use*.

> Information use occurs when the recipient processes information by engaging mental schemas and emotional responses within a larger social and cultural context. The outcome of information use is a change in the individual's state of knowledge (increase awareness, understand a situation), or capacity to act (solve a problem, make a decision, negotiate a position). (Choo et al., 2000, p. 14)

This approach is very close to the activity-based formulation that we proposed at the end of Chapter 1. In the definition above, the 'image(s)' that people entertain about the self and the world are described in cognitive (mental schemas), emotional and cultural terms and are the first targets of information; observable actions come in second order. Social researcher Robert Rich (1975) examines the relation between social science related information and policy-making, and makes a similar distinction between 'conceptual' and 'instrumental' uses of information. A conceptual use generally occurs from three to six months after the information is initially received, and changes the way that users know and think; an instrumental use occurs within three months after delivery and the impact of information can be clearly documented in memo's, legislation and the like.

Rich's distinction is paralleled by library scholar and information scientist Robert S. Taylor (1986) who categorizes the purposes of information into two types: tangible and intangible functions. Tangible functions include direct triggers for action and responses to questions, while the intangible include informing, instructing, clarifying, and socializing. Exposure to information can result in at least two kinds of results: 1/ changes in the knowledge and the image of the recipient (conceptual or intangible); and 2/ application of the information to some task or decision (instrumental or tangible).
In an earlier article Taylor (1982) uses different terms and thereby paraphrases and activates the DIKW-hierarchy model (see 3.4.3). Taylor advocates a process by which data are organized into information; through the processes of selection, analysis, and judgment, data-based information becomes something that can educate, inform, and contribute to personal, professional, and cultural growth (here the element of *Bildung* enters IBR). This first form of knowledge is called informing knowledge (intangible function), which can add to or change one's picture of the world and therefore affect a person's decisions and actions. It is contextual and nutritional, but is not immediately useful or productive knowledge. The second form of knowledge is action- or decision-oriented, and knowledge of this type is called productive knowledge (tangible function). Thus, not all knowledge becomes productive in the practical sense; in fact, most knowledge remains part of the educating, informing, and enjoying context from which we extract portions to help us in making data productive. The process of moving from informing to productive knowledge which results in action, according to Taylor, is a judgmental process, where options are presented and advantages and disadvantages weighed. This last step (the judgmental) is usually done by the final user, the one who says: "If I do X, then Y". This decision process is a personal one and utilization of formal knowledge will depend not only on its validity, quality, or ease of access, but also on the degree of "fit" between the knowledge provided and the information environment within which the user operates and where he must make decisions. It is this "fit" that determines the value of that knowledge (see Fig. 4.3 for an overview).

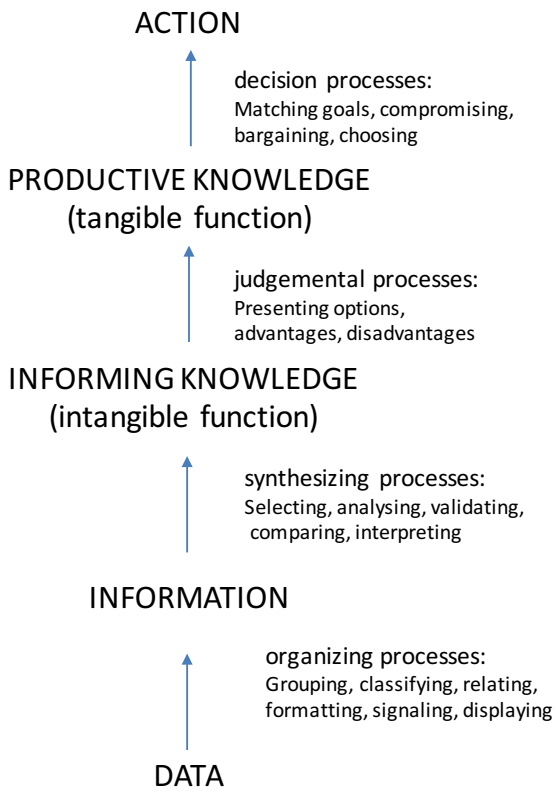


Figure 4.3. The tangible and intangible function of information (after Taylor, 1982).

Finally, in a third article, Taylor (1991, p. 230) comes to refining the kinds of impact that information may have on existing knowledge structures by defining eight, not mutually exclusive categories. Taylor's data are gathered from professional groups such as legislators, engineers and physicians but can be extended to a more generic context:

1. Enlightenment. Information is used to develop a context or to make sense of a situation. Enlightenment is not used here in the sense of divine illumination but relates to questions such as: "Are there similar situations? What are they?"
2. Problem Understanding. Information is used in a more specific way than enlightenment-it is used to develop a better comprehension of a particular problem.
3. Instrumental. Information is used so that the individual knows what to do and how to do something. Instructions are a common form of instrumental information. Under some conditions, instrumental information use requires information use in other classes.
4. Factual. Information is used to determine the facts of a phenomenon or event, to describe reality. Factual information use is likely to depend on the actual and perceived quality (accuracy, reliability) of the information that is available.

5. Confirmational. Information is used to verify another piece of information. Confirmational information use often involves the seeking of a second opinion. If the new opinion does not confirm existing information, then the user may try to reinterpret the information or choose between sources to trust.

6. Projective. Information is used to predict what is likely to happen in the future. Projective information use is typically concerned with forecasts, estimates, and probabilities.

7. Motivational. Information is used to initiate or sustain personal involvement.

8. Personal or Political. Information is used to develop relationships and enhance status.

This view strongly counters Kivy's assertion with regard to Historically Informed Performance and the way that information should be distinguishably present in the sounding result (see chapter 1). The one on one relation between information and outcome is not an essential function of information in the framework of IBR, it is only a possibility.

#### *4.3.2.4 Information behaviour in the arts*

Artists have not enjoyed much attention in IBR-studies. Librarian Susie Cobbledick (1996) argues that a probable explanation lies in "the persistent appeal of certain preconceptions concerning artists - that they are intuitive, self-contained individuals who create via inspiration" (Cobbledick, 1996, p. 344). People like that, it is presumed by IB-researchers, have information needs that are entirely fulfilled through 'divine intervention'. By consequence, the studies that are available are very limited in their scope and methodological *envergure* and are mainly situated in the realm of the visual arts. Cobbledick (1996) presents in-depth interviews with four artists - a sculptor, painter, fiber-artist, and a metalsmith - and drawing on "years of personal observation" (Cobbledick, 1996, p. 348), she pre-structures her interviews by means of five needs for information. Remarkable and rather specific for field of interest here, is the inclusion of 'inspiration' in the list of needs that guides her investigation:

- An inspiration need relates to ideas, moods, emotions, general or suggestive visual information – "anything that serves as a motivator or catalyst in the creation of art".
- A need for specific visual information concerns the sources of the visual elements that appear in finished work.
- A need for technical information about the characteristics and properties of the various techniques and media used to create art.
- A need for staying updated with the current trends in the visual arts as it is found in journals, magazines, exhibitions.
- A need for business information about shows, commissions, and sales is used for finding work and exhibiting and selling work.

From interviewing four artists – a very small sample indeed – no definite conclusions are drawn. Each of the participants seems to consult libraries and journals, but most information is gained through contacts with other artists and sometimes also through experimentation. Cobbledick concludes that "artists need to have access to the universe of knowledge, not merely to some of its parts, and libraries that would meet their information needs must become access points to that universe" (Cobbledick, 1996, p. 365). Librarian William Hemmig builds on some aspects of Cobbledick's work in a literature review (Hemmig, 2008) and an empirical study (Hemmig, 2009). From the literature review, he concludes that "nearly all of the literature focuses on art students, academic art faculty, or librarians, and so any claim that practicing artists fit the model[226] is largely unsupported by research" (Hemmig, 2008, p. 343). Nevertheless, in general terms, Hemmig is supportive of Cobbledick's model and adds more specific elements.

- Artists frequently need information on subjects unrelated to art and that's why the traditional art library does not serve artists well. In fact, it is the public library that has the resources to best serve artists.
- Creative information needs and behaviours are extremely idiosyncratic and individualistic and there is a strong preference for serendipitous browsing.
- When mediation is desired, social mediation is preferred over use of catalogues and indexes (especially when materials and techniques for marketing and career guidance are concerned).
- Priorities are given to specific sources by different communities, the most pronounced example being the use of art periodicals: students use them heavily to learn of current trends in the art world, while established artists use them far less often.
- There are differences not only between the information behaviours of artists and art historians, but also between those of practicing visual artists, art students, and academically-affiliated art teachers.

Hemmig's conclusion is that next to the solitude of much artistic activity, artists do form communities for types of support, stimulation and learning and that a model of the 'shared repertoire' is probably the best fitting information model for practicing artists. In a subsequent article, Hemmig reports on a quantitative study which he administered to a sample of a community of practicing visual artists in order to determine the community's use of various information sources in the service of creative and sales activities. In the study, he surveyed 44 practicing artists, most with no academic affiliation. Hereafter a summary of the most noticeable results:

- The top six sources of inspiration are: forms occurring in nature; personal life experience; works of art seen in person (includes architecture); man-made objects other than works of art;

[226] Referring to Cobbledick's model.

images and/or text in art magazines, periodicals, newspapers; images and/or text in art books (includes exhibition catalogues).

- Important (2nd place) in the category 'specific visual elements of information' are images generated directly from the own imagination.
- Experimentation and exchange with artist colleagues are mentioned as the main sources of information with regard to materials and technique.

Hemmig concludes that artists' needs are idiosyncratic, that they like browsing, and that social contacts are important, especially for technical and marketing information.

Regarding the information behaviour of professional musicians there's currently no specific study available.[227] A recent study on the information behaviour of practising musicians (Kostagiolas et al., 2016) has been published recently but since amateur musicians in a community band are the specific target group in the study, the results are not really fitted to the concerns of professional musicians. One finding, however, seems to be transferable to a professional context. In calling out the barriers for information seeking, Kostagiolas et al. (2016) observe that some of most frequent barriers encountered[228] are related to the music information seeking process which requires specialized knowledge and a new set of skills, the 'music information literacy' skills (Kostagiolas et al., 2016, p. 10). These skills include according to Kostagiolas et al.: 1/ the formulation of questions through key concepts and terms; 2/ identification, location and retrieval of information; and 3/ development and implementation of searches in the appropriate information resources.
Within the same context, the American Library Association's (ALA) Presidential Committee on Information Literacy defines the 'information literate person' in its final report in 1989:

> Ultimately, information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information, and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning, because they can always find the information needed for any task or decision at hand. (Association of College and Research Libraries, 1989)

#### *4.3.2.5 (Re-)modelling information behaviour*

The elements that are represented above are part of a 'standard-view' in IBR. However, if we envisage IBR to be part of a larger project that aims at granting information a considered status in music performance, at least three problems/objections/remarks/adaptations require our attention.

[227] Case confirmed this state of affairs in a personal communication (7/01/2016).
[228] For instance: the lack of familiarity with ways of efficiently searching information, the large volume of uncontrolled information in the internet, the unavailability of reliable information resources, the difficulty of evaluating information prior to its use.

Firstly. While most research output in the field focusses on the information user as a point of departure ('the user initiates the system'), another element in Wilson's definition, 'passive reception', is in danger of being overlooked.[229] Probably, due to its origins in library science, there is little to be found on the power and impact of the tacit structure and *Image* of the information resources themselves, and on the decisive influence they have on individual and collective choices.[230].Wilson mentions 'passive reception' as an instance where information is not acted upon, but that formulation does not account for the hidden and intentional information communication that reaches recipients, and often subconsciously influences their images, attitudes and decisions.

If we distance ourselves for a moment from the user-centred view of information behaviour studies and borrow from the sociology of knowledge, we find a particularly interesting perspective in sociologist Basil Bernstein's 'pedagogical device' (Bernstein, 2000). This device concerns the ensemble of rules or procedures via which knowledge is converted into classroom talk, curricula and online communication. Three fields are thereby connected: 1/ a field of production (where knowledge is produced); 2/ a field of reproduction (schooling institutions); and 3/ a field of recontextualisation which mediates between the two former fields and consists in appropriating discourses from the field of production, and transforming them into a pedagogic discourse. The position of the field of recontextualisition is quasi-similar to the one of information systems, it mediates between a field of knowledge and a knowledge-seeker, be it here in a pedagogical context. The difference between the information behaviour model and the pedagogic device is the inverse direction in which they operate: information behaviour takes the seeker/user as a point of departure, whereas the pedagogic device starts from the field of knowledge production and shows how rules[231] modify knowledge before it reaches the field of the user. We would therefore advocate an explicit, bi-directional connection of the areas such as it is for instance found in everyday information architecture[232] where two main approaches can be distinguished: top-down, which focuses initially on the information content (see

[229] At least in the publications that where consulted in the context of this dissertation.

[230] Earlier publications from the mid-70s till the mid-80s are probably an exception (Belkin & Robertson, 1976; Belkin, 1984).

[231] These rules are hierarchically related; the recontextualising rules are derived from the distributive rules, and the evaluative rules are derived from the recontextualising rules. The function of the distributive rules is to regulate the relationships between different groups by distributing different forms of knowledge, and thus constituting different orientations to meaning. Recontextualising rules move a discourse from its original site of production to another site, where it is altered as it is related to other discourses. The decontextualized discourse no longer resembles the original because it has been pedagogised or converted into pedagogic discourse. Evaluative rules are concerned with recognising what counts as valid acquisition of instructional (curricular content) and regulative (social conduct, character and manner) texts (Bernstein, 2000, chapter 2)

[232] Designing, organizing, labelling and creating sitemaps, content inventories and navigation systems for websites to help people find and manage information more successfully.

pedagogic device), and bottom-up, which takes user needs as the starting point (see information behaviour) (Feather & Sturges, 2003, p. 252).

Secondly, this bi-directional perspective on the flow of information has important consequences for the understanding of information systems where, traditionally, top-down operations are poorly represented. Situated between the information resources and the information seeker, Wilson (1981) distinguishes within the field of information systems between a 'mediator', generally a human being (an information broker), and a 'technology', a combination of techniques and tools that assist in the search for information[233] but he does not, at least not explicitly, include the scope of immaterial top-down filters such as curricula, disciplines, curricula and knowledge categories. Headrick (2000, pp. 4–5) gives a useful overview of categories of information systems which he calls 'technologies of knowledge' since they supplement the mental functions of thought, memory, and speech in the course of organizing and managing information. Five categories are distinguished:

- Systems used to gather information (search and research methods).
- Systems for naming, classifying, and organizing pieces of information to make them comparable and accessible in an efficient manner (e.g. libraries, curricula, biological taxonomies).
- Systems used to transform information from one form into another and to display it in a new way (lists -> statistical tables -> graphs -> three-dimensional objects).
- Systems designed for storing and retrieving information (dictionaries, and encyclopaedias, museums, archives, libraries, and botanical gardens).
- Systems for communicating information (postal service, messengers, the telegraph, the telephone, or electronic mail, newspapers, radio, television).

The critique on an overly rigid perspective on information systems is important if we want to understand the information behaviour of musicians and challenge and meaningfully counter the one-sided assertions that IBR-authors such as Cobbledick make about the belief that artists rely predominantly on 'divine inspiration' as an information system.

A final problem with the generic model represented in Fig. 4.2 is that Wilson (1981) explicitly remarks that information the 'universe of knowledge' might be drawn upon directly by the information seeker through information exchange via people in the user's reference group or life world (peers or experts) who are then considered as the embodiments of information (Wilson, 1981). Directly 'drawing upon a universe of knowledge' becomes problematic since in a follow-up publication, Wilson quite strongly avoids the term 'knowledge' because "knowledge is knowable only to the knower; it cannot be

[233] Wilson's model dates from a pre-WorldWideWeb era but the terms can be extended in contemporary settings.

transmitted – only information about the knowledge I have can be recorded and accessed by another person, and that information can only ever be an incomplete surrogate for the knowledge" (Wilson, 2000, p. 50).

Information systems as a concept are a thorny issue in the field and there is no agreed definition in the literature (Feather & Sturges, 2003, p. 306). They are powerful gatekeepers that negotiate between an ever expanding information galaxy (McLuhan, 1962) and the inherent limits of human information processing. For the sake of overview and to make the basic design of information behaviour useful to our purposes we propose to subsume under the label 'information systems': formal and informal systems, technological and human mediators and also immaterial filters such as curricula, practices, research methods and taxonomies.

Taking into account these remarks and additional perspectives, we might then agree on the heuristic tool as represented in Fig 4.4. It represents a bi-directional flow of information which is mediated by information systems that include human, technological and immaterial filters. By implementing the notion 'informavore', an inherent need for information (either primary or secondary) is acknowledged while the term 'information galaxy', which refers to McLuhan's Gutenberg Galaxy, implies that we are dealing here with information that has it roots in texts (intentional forms of information) and not so much in ecological information.

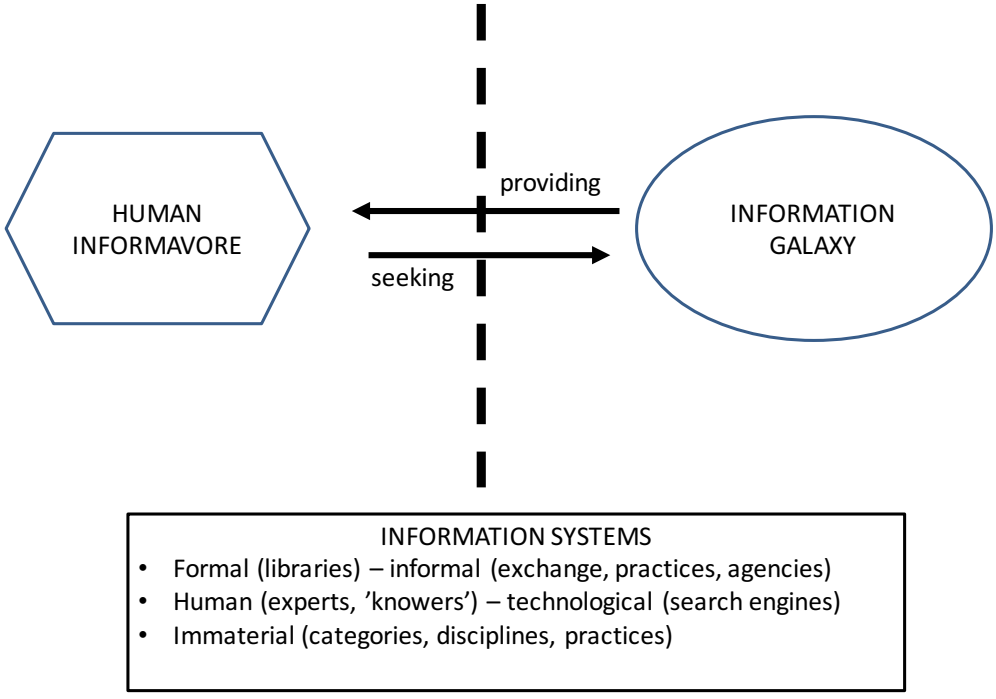


Figure 4.4. A heuristic framework of information seeking.

## 4.4 Chapter summary

Above, we consulted three fields of investigation that provide a generic, dispositional perspective on information in action and its relation to imagination.

From an evolutionary perspective, a partnership between information and imagination was explicitly present in analyses of cave art where imagination is suggested to be a tool for offloading information, directing attention to important features of the environment, and as a means to provide information regarding the individual and imaginative minds of fellow-humans. A sequential, evolutionary continuum between information and reality that connects imagery and creative imagination could be theorized with a crucial and pivotal role for cognitive fluidity which allows humans to communicate information between otherwise separated and domain-specific fields of expertise.

From a developmental point of view, two seminal perspectives were reviewed. Both Piaget and Vygotstky consider imagining and informing oneself about a phenomenological reality as complementary strategies to cope with the world. However, they disagree regarding the development of their respective aspect-ratio during life-time. Piaget favours information to imagination which he situates early in life when an adequate amount of information is yet to be acquired whereas Vygotsky considers information to constitute the early building blocks for a rich imagination later in life. Our aim was not to arbitrate between the views of Vygotsky and Piaget but rather to indicate that the information-imagination alliance is not only a historical field of negotiation (see Chapter 3) but is also a factor in ontogenetic considerations.

Finally, within the domain of Information Behaviour Research, we identified the main tenets and structures of information behaviour which generally involve three actors (user, system, resource), three dimensions (situational, affective, cognitive) and three (predominantly unidirectional) processual stages (information need, information seeking, information using). We acquired some additional conceptual vocabulary by reviewing some of the literature that pertains to each of the three stages. 'Information needs' are the most challenging aspect to theorize about and to validate empirically. Some of the insights and distinctions point to a generic informative impulse: 1/ from the view of evolutionary biology, our hunger for information (humans as 'informavores') can be seen as originating from an orienting response to environmental cues which then evolved into a behavioural habit and disposition; 2/ information needs seem to serve bigger purposes (survival, affection); and 3/ a specific need surfaces in situations of uncertainty which lead to experiencing an emotionally supported cognitive gap . While acknowledging different types of informal information gathering and behaviours such as information avoidance, the term 'information seeking' is preserved for instances of purposive or intentional behaviour that follow a specific information need. The phase of information seeking is typically subdivided in several actions (browsing, chaining, monitoring,

collecting, selecting) that are supposed to bridge the cognitive gap and relieve the feeling of uncertainty. Considerations of 'information use' are congruent with the conclusions that we drew from the terminological investigation in chapter three. Information can effectuate and immediate and observable result thereby referring to the archaic notion of information as 'giving form to', but information can also cause an effect to the image one has about the self and the world. Several parallel languages are used to make that point: informing versus productive knowledge, intangible versus tangible function. Within the domain of information use we could also assert that not every engagement into an information process leads to a successful outcome; several barriers were discussed of which the main one is the difficult relation between new information and ingrained beliefs that are either individually acquired or intersubjectively present in cultural practices or dispersed fields of expertise. As in Chapter 2, we could conclude that, in some cases at least, informing oneself extra-disciplinary and beyond the conformational horizon of settled beliefs is rather an act of innovative and courageous rebellion than one of conforming to the *status quo.*

It was also noticed that the information behaviour of artists is poorly represented in the pool of publications related to IBR. Moreover, the limited quantity of studies available are usually very narrow in their methodological scope and tentative in their conclusions. Three insights however caught our attention:

- IBR-studies struggle with categorizing the information needs of artists and this has consequences on the development of adequate information systems.
- IBR-studies that are situated in the artistic field typically incorporate 'inspiration' as part of the artist's information needs.
- Most studies indicate that informal, collegial exchange, experimentation and the own imagination serve as the main sources of information (see the role of the teacher in music education as discussed in the previous chapters).

In general, the various elements that we gathered from a generic, dispositional and behavioural perspective are supportive of the activity- and psychology- based view that we developed in the previous chapter and offers counter-arguments to the dismissal of information in an artistic context as it was first asserted in Chapter 1. Dealing with information is an inborn capacity that allows organisms to survive and in the case of Homo sapiens to imagine new situations and environments to be shared with fellow-humans via cultural artefacts. However, dealing with information is not self-evident: constructing adequate information systems that resonate with a user's practical concerns are a major challenge in our times and next to this more practical element also a new dialectical domain opened itself in this chapter, the one between information and habit or tradition. IBR-studies indicate an extensive list of functions attributed to information: information can be enlightening, it can be of

assistance in problem understanding, it can confirm beliefs and opinions or define new interests. Based on the findings in Chapter 2 (HIP & SIPP) and the considerations in 4.3.1. we should also add ‘innovative’ and ‘explosive’ to the list of functions of information.