The Role of Wisdom in Human Behavior

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Abstract

The role of wisdom is often seen as the ability to suppress the passions and let human conduct be guided by reason. A central point made here is that humans, like all animals, cannot live without innate drives to energize behavior and give it direction and meaning. To attain wisdom, the innate primitive impulses have to be differentiated and adapted to the actual environment and the social context. For humans, this refinement is made possible by a long period of individual maturation and by strong drives emphasizing social interaction. By drawing on insight from a range of different branches of science I am discussing the mechanisms by which the individual mind and society in its larger structure develop and how wisdom to this day is playing a fundamental role in the creation and maintenance of fruitful and harmonious social life.

Wisdom is generally considered as a higher, nobler, form of intelligence. Intelligence is often defined as the ability to achieve goals in varying contexts. Two aspects enter into consideration – the structure of the goals that are pursued and the knowledge and mental capacities employed to pursue them. Wisdom requires greater knowledge and mental capacities, but it results above all from higher maturity of the goals chosen to guide behavior.

In this essay, I am attempting to create a comprehensive view of all the factors that constitute and shape human behavior, from genetic determinants in the individual to the webs of social conventions of large-scale societies. I am writing an essay and not a scientific article as the subject I intend to cover is so fraught with taboos, prejudices and basic discords and sits so askew between fields – anthropology, ethology, neuroscience, psychology, sociology, philosophy, ethics, theology – which all have a stake in the matter, so that all I can do is formulate, from my own point of view, a perspective on the subject matter that may or may not find resonance with the reader.

A basic conceptual framework for understanding the guidance of behavior was formulated in the fifties by K. Lorenz, N. Tinbergen, E. von Holst and others Immelmann and Klinghammer [1983]. All animals are, like humans, born in a state of complete if simple functionality and carry in them a range of innate goals or 'drives'. Some animals live with essentially unaltered innate drives and functionality all their lives, whereas others, like us, need to develop and adapt functionality and drives within their environment. Drives are implemented physically within a complex of brain structures I refer to here collectively as the brainstem. According to the cited ethologists, each drive is formulated as a pair of schemata for perception and action. A drive can be primed by inner urges and triggered externally when its perceptual schema finds a match within the current sensory environment. When thus activated the drive applies its action schema. Schemata are thought to be laid down in the brain as neural structures composed of nodes (sets of neurons) and links (neural connections between those sets of neurons). Due to their relations to sensation and to action, both nodes and links carry meaning.

To initialize drives, they are endowed at birth with connections to rather concrete and simple sensory and action patterns. For humans, some important drives are mediated by the face as communication surface, and according to infant psychologists rather schematic faces (like arrangements of dots and dashes on a table tennis bat) can elicit simple orientation reactions and emotions soon after birth, thus serving to initialize the engagement of those drives [Simion and Giorgio, 2015]. Later, these simple first versions are complemented and overwritten by rich and more and more differentiated instantiations of the abstract schemata, as discussed below.

The realization that mental structure may be organized by schemata has a long tradition Kant [1781/1999], Husserl [1980], Bartlett [1932], Piaget [1923], Rumelhart [2017]. An important unresolved issue is how the distance between the abstractness of a schema and the detail of concrete instances of it can be bridged, i.e., how concrete sensory patterns can activate an abstract perceptual schema and how a concrete action can be generated from an abstract action schema. I here proceed with a hypothetical mechanism based on which I have successfully created concrete systems of pattern recognition in computer simulation von der Malsburg [1988]. According to this idea, the connections between the nodes of a schema and the elements of an instance are established by network self-organization. In the process of network self-organization von der Malsburg [1994], out of the currently excited mass of neurons and connections a subset is dynamically selected that forms a self-consistent network, self-consistent in the sense that all active neurons are strongly supported by other neurons of the network through the connections that form the network. In the context of schema matching, schemata and instances are represented by self-consistent networks, and if they bear a structural relation, network self-organization can tie the schema and instance networks together into a larger self-consistent network in which nodes with similar meaning in schema and instance are connected one to one, such that related nodes in the schema are connected to related nodes in the instance, a structural relationship that is referred to as 'homeomorphism.' In the simplest case, the relation between nodes may be neighborhood in space or time, like the spatial relations of the dots and dashes of a facial schema, or the temporal sequence of vocal elements in bird song. Scene elements themselves may again be describable as local clusters of certain features or by spatial or temporal patterns thereof.

When, in a specific situation, the perceptual schema of a drive has been activated by a matching sensory pattern, a behavioral reaction pattern is generated to respond to the situation, again by the process of homeomorphic mapping between schema and a pattern of appropriate action elements. For example, the baby orients towards the face and shows emotional reactions; a kitten, being triggered by a stimulus in the form of a rapidly moving small object, chases the object and tries to pounce on it; ground-living birds seeing a dark cross moving overhead run for cover, the cross being taken as a bird of prey. The innately pre-wired connection patterns between drive schema and sensory input and action output are just good enough to initialize the drive in some appropriate situation but are then quickly modified by adaptation to the actual sensory patterns encountered and motor patterns performed, depending on the success or failure of the performed action.

The structure of drives is the result of evolution. The one central goal of evolution is the handing on to offspring of the individual's or species' structure as encoded in the genes. This central goal is supported by auxiliary drives directed at preserving the own life by finding food, avoiding danger, finding and selecting sexual partners, and breeding. The different drives form an intricate architecture, some drives being mutually exclusive in a given situation, others supporting each other (for an early model of such interaction see Kilmer et al. [1969]), and many drives are complex composites of several interacting elementary reaction patterns.

In simple animals, the drive system may perhaps be seen as a bundle of reflexes designed by evolution such as to guide the animal through life. The building of an orb-web by a spider, for instance, seems to be the result of a sequence of elementary tactile stimuli triggering simple actions through which the animal interacts with the growing construct Corver et al. [2021]. As long as little learning is involved in a given species, the animal is guided through life blindly by its innate reaction patterns instead of by foresight. And yet, one may speak of wisdom: the individual reflexes, which one by one make little sense, add up to vital results, like the finished orb or vital offspring. The wisdom, however, is that of evolution (or, in the perspective of natural theology, the creator Paley [2006]) and not that of the individual.

This basic behavior control system arose as a bundle of reflexes in early ancestors and evolved and differentiated over the eons to form that of higher animals. Much of the behavior control system is implemented in a rather small part of the brain located in the brainstem. This vital sub-system of the nervous system is referred to by various names, for instance as 'central command system' Kilmer et al. [1969] or as 'behavior control column' Swanson [2000]. Profound similarities of behavioral control across widely different branches of the animal kingdom give reason to believe that its basic mechanisms have developed more than a billion years ago, while each species combines and modulates them for its own lifestyle in its particular ecological niche. One thus may speak of an architecture or toolkit on which evolution can play by combining elements the origin of some of which go back to Precambrian times.

The brainstem seems to be in itself a complete if simple brain, self-contained in terms of sensory input and somatic and motor output. (In experiments it has been shown that a rat whose cortex has been surgically removed is still capable of simple behavior Whishaw et al. [1981].) There is currently very active neuroscientific research into the control of basic behavioral patterns by neural and humoral interactions within the hypothalamus Fong et al. [2023] and other structures subsumed here under the designation 'brainstem.' A rather random selection of examples are parenting behavior Ammari et al. [2023], Valtcheva et al. [2023], the regulation of appetite Ly et al. [2023], Barbosa et al. [2023], motivation and control of learning Krok et al. [2023] or decision making Chantranupong et al. [2023]. There may be a few dozen of such more or less interdependent innate drives and behavioral patterns, which together with elementary sensory-motor orientation and reaction circuits are more than sufficient to interactively generate rather complex behavior, as illustrated by the spider's orb-web construction already mentioned Corver et al. [2021], by precocious animals in general, or by simple artificial constructs Walter [1953], Braitenberg [1986], Dörner [1999], Floreano and Mondada [1996].

Whereas behavior controlled by drives in their innate form is sufficient for many animal species to structure their lives, evolution has discovered in the course of the eons that the success of a species could be vastly improved by letting the drives be differentiated with the help of learning during the lifetime of individuals to make them sensitive to larger and larger contexts and let them control more and more complex action patterns. To accommodate all the necessary circuits, evolution supplemented the original central command system, the brainstem, with massive brain hemispheres. For humans, this amounts to a thousandfold expansion. In the case of human and mammalian species I will refer to this added structure as 'cortex'[1].

Before coming to the mechanisms by which the structural space of cortex is filled with detailed mechanisms, let me discuss how the small brainstem structures can control the much larger cortex. The 'nuclei' of the brainstem Coulombe et al. [2021], Swanson [2000], Chen et al. [2022], Fong et al. [2023] generate, in addition to neural signals, a multitude of hormones, neuropeptides, modulators and transmitters – chemical signals that are released into the bloodstream or through extensively branching fiber plexuses. These substances in their number and complexity are still confusing to scientists but are known to profoundly control or modulate the body's metabolism and function as well as all of the individual's behavior (see, for instance, the strong modulating influence of just the three hormones serotonin, dopamine and oxytocin on behavior Grieb and Lonstein [2022]).

To attune the cortex to its task of differentiating the brainstem's repertoire of behaviors, evolution may have structured it as an enlarged image of the brainstem. For each of the brainstem's nuclei (the hypothesis goes), the cortex developed a specific area to play the functional role corresponding to its 'parent' nucleus. And while a brainstem nucleus may have hundreds of neurons, a cortical area has millions, and where two brainstem nuclei have thousands of connections the corresponding cortical areas would have hundreds of millions, structured randomly at birth but ready to form highly specific circuits as the result of learning. Due to its much larger number of neurons and connections cortex has, for each fundamental behavioral pattern, space to accommodate a very large number of differentiated versions, overlaying and redefining the original brainstem reflex and its perceptual trigger and behavioral reaction pattern. Bi-directional connections between the brainstem's nuclei and the corresponding cortical areas would then be the basis for the brainstem acting as teacher for the cortex, enabling it to learn refined versions of the original reflexes, and those cortical images of the reflexes could engage their own or the brainstem's outgoing signals to modulate the whole organism's reactions, some of which we perceive as emotional. Thus, the brainstem would indeed be in the position to act as puppet master pulling the strings of our behavior.

How does the brainstem serve as teacher to the cortex? In distinction to current artificial intelligence systems LeCun et al. [2015], Segessenmann et al. [2023], which passively absorb regularities from massive amounts of human-generated sample data, animals and humans learn much more efficiently by picking up structure from very few relevant experiences that the brain can recognize, classify and segment out of whole situations under active guidance by drive schemata. In the example of a gosling at the moment after hatching, the drive 'identify thy mother' is activated by internal signals, the gosling matches the drive's perceptual schema to the situation and identifies the 'moving and sound-emitting object nearby' Lorenz [1935]. The gosling then stores, in the once-in-a-lifetime process of imprinting, the actually perceived sound and sight of the moving object as the concept of its mother not only in the brainstem but presumably also in the wulst (birds' equivalent to cortex), overrules the innate mother schema's sensory definition with the now more detailed 'cortical' version which is specific to the looks and sounds and smell of its one-and-only mother, and relies for the rest of its life on this new perceptual schema to detect its mother's presence, reacting to her with the behavior mandated by

[1]I am using the terms 'brainstem' and 'cortex' as short-hands for rather complex structures composed of intricately intertwined subsystems and nuclei, without needing to commit here to which of these belong to one or the other

the corresponding innate action schemata and with differentiated versions thereof acquired through further learning.

The gosling's example may be taken as a paradigm of the general learning process. A situation is interpreted as an instance of one of the innate drives by matching the concomitant perceptual schema to it[2]. The identified instance is segmented out of the background (in the example, the whole of the parent animal's sensory pattern) and synaptic plasticity organizes a representation of the pattern by forming a consistent network within the segment's mass of neurons. This network, based on its structural relation to the triggering behavioral schema, can, from now on, serve as a much clearer and more detailed search pattern, in the example for 'mother.'

The restriction of plasticity to within the focus of attention formed by a schema and its segmented instance is decisive for the tremendous efficiency of animal learning compared to current methods of artificial intelligence, in which significant connections stand statistically out only after searching through tremendous numbers of training samples. This efficiency is made possible only by the interpretation of scenes in the light of drives defining the vital goals the individual is born to pursue.

In this way, the drives in the brainstem accumulate new versions of perception and action schemata so they can be enacted in a growing diversity of situations. Except in cases of imprinting, new versions of perceptual schemata do not overwrite the innate brainstem version but are stored in the cortex as a variant appropriate to and relevant to specific types of situations, or they merge with earlier versions to polish them in the light of experience. When a drive is triggered by recognition of its schema (or one of its learned derivatives) its behavioral part is acted out in a way coordinated with the relevant scene elements. The ensuing action can be evaluated in terms of its success and failure, strengthening or weakening the recently formed memory trace accordingly.

With time, a learned version of an innate schema accumulates situation-dependent subversions. Thus, the original schema for grasping, which may simply be the act of bending the fingers when the palm is touched, gets enriched by perceptual schemata that recognize, with various senses, various affordances for grasping or holding objects as well as by corresponding behavioral schemata for using different body parts or tools to enact a grasp. And all grasp movements serve, of course, as elements in more complex drives. In this way, the organism builds up a complex hierarchy of interdigitating behavioral schemata over time, but they all maintain their connection with the original drives in the brainstem. This is what relates individual actions and events to the underlying value system laid down in the brainstem and its humoral and neural signal system that holds the reigns of the brain and mind.

At birth, the definition of drives is very concrete in terms of trigger stimuli and actions. But through the process of learning these innate definitions get replaced, overlaid, complemented, refined and differentiated in myriad ways, so that the drives expressed in the brainstem get to represent the top of a 'pyramid of abstraction' Fisher et al. [2011], finding different detailed cortical expression in a vast range of specific situations. The establishment of this pyramid is gradual. An early concrete example of a particular type of situation is, in time, polished down to its essence and becomes the paradigm and archetype of a vast range of variants and sub-types.

All of this applies to many species of animals. The human species stands out from others, however, in two respects: a long period of maturation and intense social

[2]This first-sight recognition of a schema instance is not as impossible as it sounds. It has been shown Siddharth et al. [2014] that objects and actions can be reliably detected by rather primitive recognition mechanisms if these involve different sensory modalities.

interaction.

In humans, maturation is protracted over a decade or two. Whereas in animals the development of all neural circuits is limited to rather short sensitive periods Knudsen [2004], in humans, developmental plasticity of the behavioral networks is prolonged, giving drives the opportunity to expand in interaction with each other and the environment in regular stages Piaget [1923] into the coherent web of a complex personality. Moreover, specific human drives let children be guided to insatiably learn by playful experimentation as systematic as that of scientists Gopnik [2004], letting them continuously build up a large body of knowledge.

Development of a human child critically relies on social interaction. As remarked above, already shortly after birth the infant takes up intense emotional contact with the caretaker, whose face and eyes serve as guide into human culture. Children are from the first moment highly sensitive to the attention and recognition they get, quickly build up the ability to read the mind of others, to take into account their viewpoint and engage in shared attention when interacting with them Gopnik [2004], Tomasello [2014].

Part of the human complement of drives is the urge to communicate by body and language, opening the horizon beyond the here and now and creating access to the system of behavioral conventions within society. The individual's life is an unending flow of situations, of social interactions in which mutual understanding is possible only based on conventions, on understood routine, on tried-out behavioral patterns. The growing-up individual has to fit into this web and we indeed have a strong drive to learn this 'language' in order to be able to express ourselves and to fit in with our conduct. Just like with language, which can thrive without explicit codification of rules or grammar, social conventions are not in need of being formalized in their "grammar," we just pick it up by observation, trial and error.

The result of this process of adopting social conventions and harmonizing our drives with them is our character, the ensemble of our own behavioral ways, habits and values. A character is a complex organic web of intertwined behavioral patterns, each of which governed by an abstraction hierarchy at the top of which rule the drives in our brainstem. The complexities of the developmental process that shapes our character defies any attempt to separate nature from nurture – yet, just considering the hormone-triggered vagaries of puberty drives home the importance of innate drives for our behavior. Once this turmoil is settled, a more or less constant character develops which is self-stabilizing by selectively entering into life situations that support its structure.

Our behavior is a complex interplay of rational thinking and underlying drives, among them some involving emotions. Unfortunately, emotions are generally seen as compromising rational judgement Descartes [1649], Fellous and Arbib [2004], and indeed our behavior is occasionally dominated by primitive impulses, such as fear, aggression, pride or jealousy, which let us act rashly without thinking of consequences: the brainstem with its direct access to sensory and motor connections and its fast reactions is sidestepping the slower cortex. Cortex with its complex behavioral abstraction hierarchy, by contrast, takes time to create a high-level representation of the situation, in an area called pre-frontal cortex Szczepanski and Knight [2014]. It is the everyday wisdom of the individual that gives cortex time to suppress the brainstem's immediate reaction, to consider the wider implications of possible reactions to the situation and to present the result from there to the brainstem for final judgment: "reason is and ought only to be the slave of the passions" Hume [1740/1975].

The success of the human species lies in the willingness and ability of its individuals to learn from and cooperate with each other. Cooperation and mutual understanding are only possible based on conventions, on tried-out behavioral patterns, first and foremost among them language. Social conventions develop spontaneously (as can be observed for language Sandler et al. [2023], Jansson et al. [2015]) as differentiated instantiations of the schemata of innate social drives in the brains of interacting individuals. Webs of social conventions have developed over human (pre-) history within various kinds of societies into highly articulated organisms regulating life in family, clan, guild, profession, association, army, church, social layer and so forth. The substrate of these organisms, these webs of social conventions, is formed collectively by the minds of the interacting individuals, who absorb, develop and hand on from generation to generation overlapping part-representations of the organic whole.

Beyond a certain size of a society the intelligence and wisdom of the individual is no longer sufficient to comprehend the entirety of its structure and function. What, then, is the mechanism that has enabled society to develop to its current complexity? One appropriate perspective may be to see the development of societies in analogy to the evolution of the human genome. (In this context, 'society' may be defined as proposed by Moffett [2024] as a set of human individuals who are in control of some territory and recognize each other as belonging together or just as a collection of individuals interacting intensely with each other.) A society is founded by one or a few individuals with a specific mindset about what the society is to be about. This mindset may be likened, in the sense of the analogy, to the set of innate drives of an individual. In the course of the growth and development of the society – the analog of the growing-up human individual – these basic drives are expanded and differentiated into a web of social conventions, the individuals of the society applying their intelligence and wisdom to keep the whole consistent within itself and with the constraints set by the environment. Societies have a limited lifetime and can be more or less successful in competition and in the struggle for survival. A decisive basis for the model of evolution of societies is that the more successful societies are more likely and productive in spawning new societies that take over their basic mindset. History illustrates this evolution over the last millennia, a prime example being the great influence exerted by the legal and administrative structure of the Roman empire on later societies.

There is a highly problematic aspect of this evolution of societies. To a large extent, the success of a society is its ability to prevail in conflict with others. This can only be achieved by a mindset that strongly motivates individuals to stand together and to put the common fate above their own Le Bon [1952], Freud [1975], Ortega y Gasset [1932], Canetti [1973], Bloom [1995]. In another essay von der Malsburg [2019] I have referred to that mindset as 'group instinct,' implying an individual genetic basis for it. I now feel inclined to rather hold communal mindsets, webs of social conventions responsible for this behavior. In any case, this aspect of the behavior of societies is responsible for the most atrocious aspects of human history: suppression, war, material destruction and genocide. It is difficult to discern whether this ugly aspect of human history is unavoidable as ingredient of the evolution of societies and culture or whether it is an atavism to be overcome.

What is the role of wisdom in all of this? If we take it as the ability of individuals to creatively conceive of and influence social situations or activities that are in accordance with the motivations and characters of the involved individuals, then we have to accept that the scope of wisdom is limited to what individuals can grasp.

In a band of hunter-gatherers exposed to nature, most individuals would still know all members of the group as well as their social relations. Moreover, seasoned elders could hold in their mind the distilled essence of communal experience and knowledge and the abstract schematic hierarchy of the group's web of social conventions from the level of drives to the level of collective behavior. This can give them the wisdom to exert moral and religious authority and guide collective decisions, mediate and resolve conflicts, mend frayed relationships and maintain social cohesion. Even larger societies, as long as they are based on a common mind frame and are homogeneous, simple and undifferentiated, can still be understood and regulated by human wisdom.

Modern society or societies, however, with their enormous social economic, and cultural differentiation can no longer be grasped, let alone governed, by the individual mind (although gross overestimation of the individual mind's power is leading again and again to such constructs as autocracy or planned economy). Modern society derives its organic coherence from a layered normative order Olechowski [2018] of international charters, national bills of rights or constitutions, laws, regulations, contracts, policies, guidelines, and so forth. In analogy to the brain, these form a hierarchy of schematic formulations, higher layers being more abstract, lower layers more concrete and differentiated. The highest level, charters or constitutions, take the role of the brainstem with its basic, very abstract drives and values. The relation between layers is, like in the brain, that of homeomorphy, elements and their relations on more concrete levels being mapped onto the terms and their relations on the level above Olechowski [2018].

What is the role of wisdom in the context of this structure of modern society? The 'wisdom' of constitutions or charters is more that of tradition and historical evolution, which inspires the wisdom (in the proper sense) of the authors. Students of law are systematically trained to relate concrete cases to abstract law (or, in the common law tradition, to precedents), by mapping the concrete case's elements and their relations one to one to those of the legal code (or to those of an abstract formulation under which both case and precedent can be subsumed). This can be performed as an act of intelligence or cunning with egotistic or short-term goals in mind. Ideally, however, the judge, legal advisor or acting individual applies wisdom to fit the decision or act smoothly into the larger and long-term social context. Even greater is the importance of wisdom for such creative acts as drafting new law or initiating new social activities with sufficient imaginative power to give them a chance to contribute to and improve social coherence.

Vast potentials of human collaboration have been opened up by wisdom and its instruments of social organization, such as division of powers, judiciary and administrative systems, which form the framework for the growth of science and technology, and through them for the removal of cause for conflict. This has resulted in a tremendous reduction of violence inside societies Pinker [2011].

Yet, not all is well. Many societies are crippled by inner discord and contradiction of value systems, just as the character of individuals can be caught in inner contradictions. Moreover, conflicts of whole societies are continuously bursting out in collective violence. Do we have to accept this as part of continuing evolution of societal structure? After all, societal wisdom is not just thought in individual minds but communal conviction of a whole society, and communal convictions may have to go under or arise together with the societies that express them.

Wisdom is the healing force of societal structure, from individual conduct through all levels of human organization to the most abstract of whole societies or eventually perhaps of all of mankind. It soars above the passions while taking them into account, it is the arbiter between mind and drive, it relates individual conduct to global contexts.

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