

The *Tekhne*-Logic Revolution. Rethinking the “Interobjective” Dimension of the Integral Theory. Consequences and Relevance to Education

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Abstract

Wilber’s Integral Theory is a framework, widely used in different fields, aimed at unifying the premodern, modern and postmodern legacies and worldviews in one system. The subjective, objective and intersubjective dimensions of the Integral Theory correspond respectively to each one of the mentioned worldviews. This article reviews and explores in depth the interobjective dimension, necessary for a really quaternary integral approach, which has to include appropriately the human work and creativity. This is achieved through understanding the interobjective character of the *tekhne* logic. *Tekhne* is the Aristotelian word to designate “productive science”. The study discusses the foundation of the interobjective at different levels (ontological, anthropological, cultural and psychological) and describes the evolutionary character of the *tekhne* logic. Finally the article explores the relevance of this characterization to the Integral Theory; but also to Metaphysics, Epistemology and especially to Education.

Keywords

Integral Theory, Human Evolution and Development, Epistemology, Arts, Education

1. Introduction

Aristotle systematized the diverse and distinct forms of knowledge under the word *episteme*. But although *episteme* is usually translated as science, their meaning was broader than the definition that we use today. The broader sense could be translated as to know, to understand or to be acquainted with. Aristotle distinguished among three kinds of *episteme*: *teoretike*, *praktike* and *poietike*. In

the first one the focus was the research of truth and their necessary character, as in mathematics, physics or ontology. In the case of the *episteme praktike* the object of knowledge was the human behavior, centered in the perfection of the agent. It's the Aristotelian practical knowledge of ethics or politics. The *episteme poietike* in turn was oriented to productive knowledge. This kind of *episteme* was guided by the *poiesis* and, unlike the two previous ones, more than one potential outcome is possible. The *poiesis* guides the perfection of the work. This kind of knowledge was identified by the word *tekhne*, which in Latin was translated as *ars*: a kind of rational human way of constructing knowledge, productive knowledge.

Generally speaking Modernity, after Illustration, developed sciences in every possible field, following the model of the Newtonian Physics. The theoretical mode of science was generalized, and the *tekhne* mode was discredited and diminished in the intellectual panorama, by the preeminence of theoretical thinking. The *ars* scope was reduced to fine arts, and their intellectual character was limited to esthetics. Specialization and fragmentation were progressively consolidated and the modern sensitivity and corresponding worldview were generalized and taught at modern schools and universities. Theory and *praxis* seemed covering completely the human intellectual endeavor. Nevertheless by discarding the Aristotelian perspective it happened that the intellectual character of the *tekhnes* was almost lost, *episteme* lost the intelligence of *telos*, metaphysics and theology were excluded from the *episteme*, creative work remained as an irrational-emotional endeavor, *poiesis* was limited to esthetics, the practical dimension was reduced to *praxis*, etc. Discarding Aristotle happened what can be summarized in the sentence: “the baby was throwing out with the bath water”. This accumulation of circumstances, among other ones, had consequences in the worldview, and the modern consciousness was formed.

With the subsequent consolidation of the postmodern worldview, and the rising up of plural voices, a new contemporary need appeared: to think comprehensively, integrally. One of the more accepted frameworks to approach this kind of need for comprehensive perspectives is the denominated Integral Theory. Wilber (2001, 2005, 2007) integrated modern and postmodern worldviews to the premodern one. The Wilber model considers four dimensions in any consciousness act: subjective, objective, intersubjective (cultural) and interobjective (social) (Helfrich, 2008: p. 6). Three of them correspond respectively with the cited premodern, modern, and postmodern worldviews, but what happen with the fourth? To which worldview does the interobjective dimension correspond? It seems that probably a better characterization of the nature of interobjectivity remain to be done. And this clarification is interesting and necessary because the Wilber's model is widely used in different approaches: Beck & Cowan (2005) in the V-Memes of a culture, Esbjörn-Hargens (2005) or Murray (2009) in Integral Education, Laloux (2014) in the evolution of organizations, Thomas (2018) in Integral Leadership, among many others. Given this wide ac-

ception and use, it seems necessary to have a more precise knowledge of the interobjectivity.

This article explores this less systematized interobjective dimension. The first part can be understood as a characterization of the “interobjective”. The point of view developed is that the mentioned interobjective dimension is closely related with the mentioned and underestimated *tekhnē*. This article will present the logic of the *tekhnē*. In particular the thinking and rationale that is specifically known as *tekhnē* or *ars* will be justified and proposed as the articulating agent of the interobjective world. Once having the interobjective dimension well characterized, a second part will explore their evolution, and the third part their consequences and relevance, especially concerning Education.

The *Tekhnē* logic

As has been introduced the Aristotelian *epistēmē* can be productive *epistēmē* (*epistēmē poiētike*). This is a practical knowledge that enables the realization of things. For example, an artisan is one who is in possession of a technical knowledge (*tekhnē*), an art of production, an ability to create “objects”, a “know how”. The object of knowledge of a *tekhnē* is the production of a work outside the agent; it’s a productive science. A *tekhnē* is a superior knowledge, which is more than mere experience, because while by experience one knows of a concrete number of cases, by *tekhnē* the knowledge is about all the cases of the same phenomena, in unity. Although Aristotle considered that the *poiētic* knowledge of *tekhnē* had above the knowledge of *praxis*, as well as the theoretical or scientific knowledge, it needs as well the superior human faculties and in particular the intellectual capacities.

Because in Latin the word for *tekhnē* is *ars* (art), in the premodern Middle Age the word *ars* did not mean only what we understand today by art (fine arts), but was used, with the same meaning of *tekhnē*, to designate all the productive capacities, both the ones that generate aesthetic objects and the ones that produce useful objects, with or without aesthetic value. We find this general meaning in words derived from *ars* (art) as arti-ficial or arti-san (craftman). The objects produced by the arts are called arti-facts (created by an art-*tekhnē*).

A *tekhnē* therefore is a thought-knowledge that allows producing objects of different nature in a rational way. The difference between *tekhnē* (creative) and *epistēmē* (theoretical) is that the *epistēmē* seeks the essence of the phenomena by reaching necessary conclusions, whereas the *tekhnē* can produce several valid solutions, because it has the implicit trait to be a creative agent.

A special mention deserves the development of techniques, technology and techno-science, which are not the same than the *tekhnē*. While the *tekhnē* is an effective operation that uses a rational knowledge about the reasons for its effectiveness or a theory to apply efficient procedures in an already constituted practical-productive knowledge, the modern technology was developed from an alliance of the development of techniques with the knowledge of theoretical sciences. Thus, technology is understood as applied science, either as an instru-

mental discipline (technique) or more recently as techno-science, that is a discipline with blurred boundaries between science and technology that has a high impact on contemporary societies (González & others, 1996).

Some examples of *tekhnes*

According to the type of “objects” there is diversity of *tekhne* or *ars*. Some examples are:

- 1) Materials and related to the body: Craftwork, Medicine, Gymnastics
- 2) Linguistics: Poetics, Rhetoric, Dialectics
- 3) Social constructions: Management, Leadership
- 4) Symbols of the inner world: Spirituality, Existential Arts

The inclusion of these disciplines as *ars* is not exclusive. For example: Medicine is also scientific in the empirical-theoretical sense, of course. Their consideration as *tekhne* alludes to the part of the medical professional knowledge, which is learned by experience. On the other hand the inclusion of Spirituality lies in the consideration of the knowledge about the “spiritual work” or “spiritual exercises” in a given tradition. But spirituality can be understood as well as *praxis*.

2. Rethinking the “Interobjective”.

Ontology of the “interobjective”

Wilber (2001, 2005, 2007) used the term “social” as the defining element of the interobjective field. Nevertheless the term “social” has a broad meaning. For example, is not exactly the same “social” than “societal”. On the other hand some aspects of “social” are indistinguishable of “cultural” (intersubjective). According to Harari (2014) all the social representations are imaginary. In this sense it’s interesting to understand the nature of institutions, organizations, companies or legal entities, that despite appearing to have an entity, an existence, this one is given only in the representative mind of people. An example of Harari (2014) is:

“In what sense can we say that ‘Peugeot’ exists?... Peugeot is a fiction of our collective imagination... We can’t point it out, it’s not a physical object, but it exists as a legal entity. Like you or me, it depends on the laws of the countries in which operates, can open a bank account and have property, pays taxes and can report for it, and even can be taken independently from the owners or employees” (Harari, 2014: p. 52). “A large part of the history revolves around this question: How do convince millions of people to believe in certain stories about gods, nations or limited society companies? Getting it gives immense power to sapiens, because it allows millions of strangers working with a common goal. Imagine how difficult it would be to create states, churches or legal systems if we could only talk about things that exist like rivers, trees or lions” (Harari, 2014: p. 55).

Therefore the “social” representations are of the same nature and located in the same dimension than the cultural ones. Although societal developments are

apparently more static (state is related with static) than the cultural, which seem more flexible, all are referred to internal intersubjective meanings. Definitely societal dimensions can be understood as developmental intersubjective lines, as well as there are developmental individual lines in the subjective domain (Wilber, 1993). Nevertheless in the intersubjective dimension the consciousness is collective while in the subjective sphere consciousness is individual. Once having the nature of the intersubjective clearly established, it can be questioned what does it remains as genuinely interobjective.

Going to basics to answer this question, Wilber defined the interobjective world as made up of relations between objects. This is the way in which Wilber defined the space for the “Its” as being differentiated from the intersubjective “We”. Beginning from this more abstract Wilber starting point, once the “objects” from the objective dimension are well known, it can be understood what the “relationships” between these objects are. Note that the emphasis is in the word “relationships”. The new things in this area are the relationships, this area consists in relationships, in sum: it’s relational. Advancing in that idea, there are different types of “objects” in coincidence with recent neuropsychological findings (Damasio, 1994, 2001; Gazzaniga, 2012). A classification would include: a) Objects that are representations of objects from the natural world, including the human brain. b) Mental images that are representational systems: human language, numbers, etc., essential for the perception and awareness of the objects. c) Mental images that are representations that are believed real, such as social or cultural systems, organized by belief systems. d) And representations of the collective unconscious or symbols.

Starting with the natural world, as Wilber does, there are natural relationships that can be observed in the physiosphere and in the biosphere. For example: galaxies, the solar system, the Gaia system for our planet, ecosystems, societies from the animal world based on instincts, etc. These are examples of systems based on relationships between physical objects or non-human biological beings. Observing accurately the objective reality it can be found how the relational nature is in everything. For example, an atom is a whole but at the same time is a relation between electrons, protons and neutrons. A living organism is individual and undivided but it is composed of related organs (organ-ism), etc. Thus this relational dimension is present in all objects.

An observation is that these relationships exist insofar they are studied. The sciences understand these relationships and the rules or laws that govern them. Mechanistic models work in the way explained by the Newtonian paradigm. Nevertheless, in relationships that involve living beings, there is a greater diversity of possibilities. In an ecosystem for example an unexpected phenomenon, that alters the conditions and gives an unpredicted result, can occur with greater probability. This also happens in the physical systems, for example unpredictable factors that condition the climate can be manifested, and more than one climatic outcome is possible. The study of relationships shows, also in nature, how this

area is subjected to greater complexity and uncertainty. Therefore it's difficult to apply laws that give a single result. Rather it is necessary to apply models with more than one possible outcome. And considering the human and noospheric world this greater complexity and uncertainty increases.

Relationships between objects: Anthropological rationale.

What is the nature of a relationship between two or more objects?

First of all it is a projection of the subject. For example the lines in the constellations of the firmament don't exist in the object. Humanity projected an order in the perceptible chaos. The chaos once ordered, relational, became Cosmos. Once the Cosmos was organized human cultures gave to it the character of agent, ordering time, space, movement, and human societies themselves!

Relationships can occur both in space and time. In space as relationships between objects in the same field (constellations are examples of spatial relationships), but also can happen in time: The relationship of an object at a given time with this same object in another moment can be an example. Relationships can include actions and transformations between an object before and an object after, in a lapse of time. One of the first examples and experiences of this kind of relationships that humanity had was with the action of fire: A food (meat) after being cooked by fire underwent a transformation and became another reality: Raw meat changed to a succulent grilled steak. A very obvious relationship of transformation! This temporary and non-static dynamism is also evident in Ecology. And sapiens realized that could intervene in the transformation of the "objects".

Another enormously meaningful example was transforming stones into tools: Selecting the appropriate flint stones, discarding the inappropriate, strike adequately (relationship of one stone with another) to break it and leaving an edge in the right place. Learning is needed. Trying again and again, keeping in mind the purpose of making a spear point to help in hunting, a knife to cut skins or food, or an ax to cut wood. They are relationships between objects, through human action, that foresees the development towards a new reality: from stone to tool, a transformational relationship.

In these relationships of transformation the presence of the "final state" is characteristic, as well as the "intentional" nature of the transformation. An idea appears in the transformative relationships between objects: the idea of improvement, of producing something useful, a new artificial object. Something that did not exist is created from an object or raw material that is transformed. The potential for human creativity was discovered. And these objects, for example the spear, by improving the effectiveness of hunting, helped the survival and security of the group pushing the evolution. The greater possibility of feeding with proteins from meat in a specie not well adapted for it (dentition) surely allowed the increasing of brain, the need for premature birth, the exposure to caregivers before the neuronal maturity, hominization, in short. In other words, the relational knowledge entered into evolution. Indeed, knowing these relation-

al elements between objects began to be a key element that helped survival. Therefore this relational knowledge, these procedures to properly select objects and transform them into assets for the community, was transferred from one generation to another. Human learning through Education began: humanization.

The technical knowledge of a group consists in relationships between objects to transform them into something necessary, useful, beautiful or novel. Present elements are: final state, intention, transformative action, persistence in the objective, correction, practice, satisfaction for achievement, motivation in unifying the action towards the objective, cultural and group acceptance, teaching novices. All are constituent and complementary parts of the interobjective domain. The aim of the human interobjective knowledge is therefore to create from natural objects (raw material) and transform them into goods for the community. Knowledge, and varied techniques and procedures are used. An example of this is a guild, common in the Middle Age. Within a guild complex and combined techniques are mastered. This is the knowledge of the group. These techniques have complexity and are unknown outside the group.

The unity of the interobjective relationships can be denominated as a group technique or group skill. In the natural world these relationships also include strategic behaviors of the different groups, instinctive and/or learned. The explanation is that there is a collective mind of a group where the relationships between objects are represented. Thus the human interobjective world consists of a set of knowledge, techniques and procedures in an intentional and creative context. It is also a tradition, specific group practices or knowledge of a “guild”. There is a process of mediation within the group between experts who master these techniques and apprentices or “novices” who learn them. This kind of knowledge is what Aristotle named as *tekhne*. An illustrative example of this knowledge can be the art of Neapolitan pizza making, which recently won a world heritage status.

There may be “relationships” of a group that have a certain relational knowledge or *tekhne* with other groups. Relationships can be collaborative or competitive. It can also be observed in Ecology, where some groups cooperate or compete with other groups. Objects produced by a group through a *tekhne* may be interesting to other groups. There may be exchange, competing groups, etc.

The interobjective relationships can be represented as nested, ones within the others (**Figure 1**).

Intellectual arts: Cultural rationale

Until here, it has been treated the interobjective world with physical objects from nature or with biological “objects”. Nevertheless it’s possible, as we explained, developing *tekhnes* or *ars* in the field of human representations.

In this sense, for example, Aristotle (2014) developed the *Tekhne Retorike*. The objects of this *tekhne-art* are the words, while the relations are the knowledge about the combinations that make a given speech eloquent and persuasive.

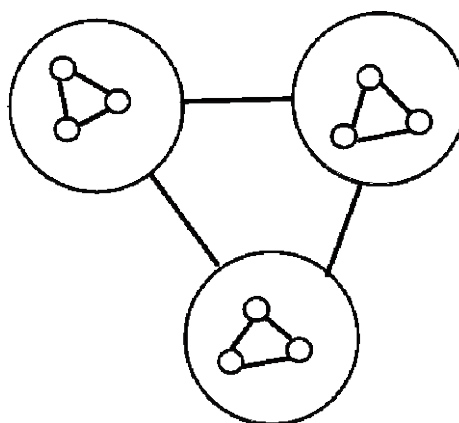


Figure 1. Interobjective relationships.

This interobjective knowledge is precisely what Aristotle denominated as *Tekhne Rhetorike*. The knowledge very rational of Rhetoric consists in a set of relationships between words (forms, rules, techniques, topics, genres) to guide the *poiesis*, that in this case is the realization of a persuasive speech. A persuasive discourse, being the product of a *tekhne*, has more than one possibility. The same dynamism exhibited in Rhetoric could be explained analogously in other *tekhne* or *ars* with diversity of representational “objects”. In this sense the traditions in ways of interpretation are *tekhnes*. For example Spence (1994) explained Psychoanalysis as a *tekhne*.

The arts, *tekhnes*, have a purpose, an objective; need techniques, intentional action, evaluation, transformation, creation of prototypes; criticism is also needed and there is learning, product creation, external evaluation. Those processes are all rational complexes of relational interobjective knowledge. They can be learned by studying from examples or cases. Arts are justified by their results in the practice, are pragmatic oriented disciplines: A speech is judged for the effect in the audience, a tool for its practical use, etc.

Psychological rationale of the *tekhnes*

The psychological correspondences of the *tekhnes* are the skills and abilities, referred generally also as competences (McClelland, 1973), which are related with practical, productive and creative talent. Today these terms are present in Education and in all organizational consultancies (Boyatzis et al., 2002), being personal talent the element recognized as the most significant for any organization and its evolution. It is not strange that relational knowledge, or *tekhne*, becomes the new center of the contemporary fluid organizations, since is aligned with the process with which the humanity was developed. The *tekhnes* are fully embedded in the human anthropology. The human specie, according Bruner (1984), has a defining technical-social lifestyle. Language is a sophisticated tool. At the developmental level the symbolic play occupies that dimension in the child development and is the ground for the subsequent learning of *tekhnes*.

If cognition as mental capacity corresponds to the operations in the sphere of the “objective”, the “interobjective” world is founded in “metacognition”

(Flavell, 1976). Cognitive Psychology developed the concept of metacognition to designate the control processes of cognition, or the knowledge of the cognitive resources and their use in practical situations. This kind of metacognitive knowledge is experiential and their acquisition requires interaction with the task. There are different kinds of metacognitive skills. Particularly interesting is the acquisition of metacognitive skills in cooperative learning (Brown, 1987, 1997) or the metacognitive competences helpful to advance towards post-formal thinking stages (Commons & Richards, 2002, Botella & Gallifa, 1995). Related with metacognitive skills there are heuristic, creative, practical-tacit knowledge abilities which define personal talent, and “know how” in diverse fields. All these modalities of thinking can be examples of *tekhnes*.

On the other hand Bereiter & Scardamalia (2003) systematized “design thinking”, the thinking mode based on design, which has the traits of being proactive, product oriented and directed to critical and purposeful improvement. It contrasts with the argumentative thinking mode centered in the presentation of arguments to convince others about the adoption of certain ideas. Design thinking is *tekhne* oriented.

These psychological counterparts of the *tekhnes* point out the relevance of the human will in psychological processes. Human will was undertreated and almost abandoned as psychological relevant category, by favoring other constructs like intelligence (Gimenez-Camins & Gallifa, 2010, 2011). The inclusion and recovering of *tekhnes* help in the comprehension of the free will and free choice. Human freedom is limited, as today point out brain researchers (e.g. Gazzaniga, 2012) but, although limited, the possibility to choose makes a difference in human behavior and has been a distinctive and foundational human trait.

3. Description of the Evolutionary Traits of the Interobjective *Tekhne* Logic

Evolution of *tekhnes*

Table 1 presents the evolution of *tekhnes* in the hominization-humanization processes.

Creation process in *tekhnes*

Next table (**Table 2**) presents the evolution in the creation of an artifact, product, good or service. It’s an artifact insofar as is produced by a *tekhne* or *ars*. It can be an artisan product, a book, a television program, a new technological application, a play, a work of art, a consume product, personal growth techniques, even a scientific article, etc. The following evolution is inspired in Aristotle’s view of the *tekhne*, in Wilber (2001b: pp. 40-41) and in phenomenology (Merleau, 1945). **Table 2** integrates in addition the unified process that *tekhnes* follow in physical, mental and spiritual spheres.

Personal development and *tekhne* mastery

Inside each *tekhne* there is a potential developmental personal process. In this case (**Table 3**) each stage, from 1 to 8, is developmental; this means that surpasses and replaces the previous one.

Table 1. Human evolution and *tekhnes* development.

P. Physical systems: Galaxies, planetary systems, Gaia

B. Biological systems: Ecological niches

1) Hunting and gathering.

Revolution of tools.

Stone age. Lithic techniques (Homo Habilis: 2.5 million years)

Control of fire (300,000 years)

Cognitive revolution (70,000 years)

2) Horticulture and pastoralism.

Neolithic revolution (10,000 - 9,000 years)

Neolithic, polished stone tools: 10,000 years, pottery and weaves (9,000 years).

Cooper Age (8,000 years)

Agricultural techniques, domestication (11,000 years: wheat, goats)

Primitive vulgar arts

3) Extensive agriculture. Civilizations. First Empire: 5,000 years

Writing 5,500 years. History beginning.

Bronze Age (4,000 years). Iron Age (3,200 years).

Money (5,000 years).

Agricultural revolution

Minor arts/Initial major arts

4) Craftsmen and artisans. Varied artifacts (5,000 years)

5) Liberal arts. City-states. Polis (2,500 years)

6) Scientific revolution (500 years)

Print press.

Industrial processes. Techniques became technology (250 years)

Industrial Revolution

Steam machine

Design

7) Proliferation of services organizations (50 years)

8) Information and knowledge technologies (25 years)

Revolution of information

Communication and media arts

Social networks

9) Existential technologies

Integral theory

Spiritual-existential revolution

10) Post-human? Control of humanity by technology? (Harari, 2014)

Table 2. Creation process of a prototype and an artifact.

-
- 1) Description of the field, problem, theme, challenge, purpose. Relevance.
Description of the object. Use of the Aristotelian categories.
 - 2) Instrumental elements. Techniques mastered, existing knowledge, paradigms, practices, examples. Adaptation of the method to the case.
 - 3) Intuited understandings. Depending on the need use of different sources of experience:
 - Sensory experience, somatic eye, mono-logical, sensitive, empiricism
 - Mental experience, mind's eye, dialogical, intelligible, rationalism
 - Spiritual experience, eye of the spirit, trans-logical, transcendent, mysticism
 Aristotelian doctrine of signatures: analogies, emulation, etc.
 - 4) Prototype creation.
First resultant version from the particular *tekhne*.
 - 5) Testing the prototype.
Evaluation and internal criticism. Introduction of prototypical improvements.
 - 6) Creation of the artifact.
Consciousness of its characteristics, adaptation to the purpose, advantages, etc.
 - 7) Presentation before a community.
External evaluation by experts, external criticism. Incorporation of improvements in the artifact.
 - 8) Introduction of the artifact in society. Production process, if it's the case.
Acceptance by the stakeholders.
 - 9) Influences in the live of people and communities.
Personal, cultural, social changes, changes in knowledge, etc.
 - 10) Balance in the creation of common good, wellbeing, utility or knowledge.
-

Table 3. Personal development in a *tekhne*.

-
- 1) Inexperienced, instinctive, intuitive
 - 2) Beginner, apprentice. Basic learning. Imitation of models
 - 3) Advanced apprentice. Acquisition of the diverse group-knowledge in the diverse aspects
 - 4) Tutelage. Independent practice of the *tekhne* with a monitoring process
 - 5) Initial autonomy. Independent. Learning from one's own practice.
 - 6) Expert. Competent. Introduction of *tekhne* improvements
 - 7) Senior. Teach, innovate, transform, investigate
 - 8) Teacher. Synthesis. Philosophy, creativity, authority, knowledge related to life.
 - 9) Teacher of teachers. Patrons/protectors of a profession
-

Developed factual *tekhnes*

The evolution of the *tekhnes* created historically developmental fields of group experience. An illustrative classification of *tekhnes* is presented in **Table 4**.

4. Consequences and Relevance

Consequences and relevance to the Integral Theory.

As far as the Wilber Integral Theory is concerned some consequences can be

Table 4. Classification of *tekhnes*.

Objective arts

Liberal arts.

Trivium: Grammar (language), Dialectics (logic), Rhetoric (ratio, reason),

Quadrivium: Arithmetic, Geometry, Astronomy, Music

Mechanical or vulgar arts.

Galen of Pergamon, in the II Century AC, denominated them *mechanical arts*. In the XII Century, Radulfo de Campo Lungo, made a classification of mechanical arts, reducing them to seven, the same number than liberal arts. They are: *ars victuaria*, to feed people; *ars lanificaria*, to dress them; *ars architectura*, to provide them with a house; *ars suffragatoria*, to give them means of transport; *ars medicinaria*, to cure them; *ars negotiatoria*, for trade; and *ars militaria*, to defend themselves.

Subjective arts

Major arts (fine arts)

Some are also known as plastic or visual arts. There are seven: *Painting, sculpture, architecture, music, dance, literature* and the seventh art: *cinema*. However, new arts are opening up with technology: *photography, comics, videogames, video art*, etc.

Minor or applied arts (craftworks)

A classification includes:

Pottery: art of making earthenware vessels, *Iron Crafts, Jewelry, Boilermakery*: trade of metal pottery (also copper, brass, tinning), *Stonework, Carwrighty, Sievery, Ceramics, Locksmith, Basketry, Cabinetmaking, Binding*: sewing or gluing sheets and covers to notebooks of texts and books, *Glyptics*: art of engraving or carving precious stones, *Cooperage, Saddlery*: art of working various articles of leather or trimmings for horses, *Spinning, Leather goods, Working with precious metals, Wood carving, Marquetry, Incrustation and coating work, Taxidermy, Upholstery, Weaver, Blown glass, Stained glass*, etc.

Performing arts

Performing arts are destined to the study and/or practice of any type of stage performance: *theater, dance, music (especially opera, ballet, zarzuela, musical theater, cabaret, music hall, concerts or recitals*, etc.)

Contemporary arts

Television and audiovisual communication as *tekhne*, sports as *tekhne*, etc.

Engineering and design

Engineering as *tekhne*.

Industrial, Chemical, Mechanics, Telecommunications, Computing, etc.

Design as *tekhne*

Arts of existence

Spirituality, spiritual exercises, as *tekhne*.

Psychotherapies as *tekhnes*: Psychoanalysis as *tekhne* (Spence, 1994)

derived after the more detailed characterization of the fourth quadrant, the “interobjective”. This characterization provides Integral Theory with a specific trait that makes possible a real fourth dimensionality, clearly independent of the other three and with appropriate meaning and relevance.

Having explored the “Its” as the place of the relational group-knowledge, ap-

plied to different kind of “objects” through a *tekhne* or *ars*, we reviewed the Wilber’s initial approach, aligning it with ontological, anthropological and psychological knowledge. This proposal is also compatible with the neuropsychological research about the represented forms of the social organization, that Wilber situated in the “Its” but that, after careful exploration, are more clearly considered as collective representations, therefore part of the intersubjective world. Effectively societal and human organizations are among the imagined collective representations (Harari, 2014). Wilber, on the other hand, clearly included the relational group-knowledge in the “Its”: “It is common to look at social evolution in terms of various modes of techno-economic production, ranging from the search for food, to the horticultural, to the agrarian, the industrial, the informational (to what I will call the lower right quadrant or social systems). Complementing this analysis with an approach to the worldviews (which change correlatively from archaic to magical, to mythical, to mental, to global)” (Helfrich, 2008: p. 21). Our proposal gives centrality to this inclusion.

The development developed by dedicating the “Its” to the knowledge of *tekhnes* and considering the social structures as representations that are part of the “We”, gives to the interobjective field the character of independent agent, and not dependent or consequence of the other three dimensions. This in addition clarifies, distinguishes and characterizes the interobjective dimension, allowing a real fourth dimensionality to the model.

The described model makes justice to the human work and at the same time includes the created and transmitted human group knowledge. Group knowledge in the general sense goes beyond to the knowledge of the objective science that is located in the Wilber’s “objective” quadrant. Without abandoning intellect and rationality this approach complete the common theoretical bias of conventional intellectual theories, making some theories closer to the real and meaningful human actions. By having this quadrant well defined, there is an unambiguous placement in integral approaches for the active and creative human potential.

Evolutionary relevance

There is also a correspondence with the evolutionary levels in the other three dimensions or quadrants, conforming the whole holarchy. **Table 5** is the result of integrating the specific work developed in the present study concerning *tekhnes*, with the table extracted from *A brief history of everything* (Wilber, 1995: p. 74) and the table from *What Is Integral Spirituality?* (Wilber, 2005: first draft, June 2005, p. 5).

Humanity evolved by revolutions highly dependent of the *tekhne*-logic development. It seems clear that the different revolutions (i.e. cognitive, horticultural and agricultural, economical, scientific, industrial, technological-communications, consciousness) implied some kind of necessary *tekhne*-related improvement. This gives special centrality to the interobjective quadrant in the Integral Theory and contributes to improve the anthropological and psychological rationale of the theory.

Table 5. The whole holarchy in the four dimensions.

It Behavioral	I Intentional	We Cultural/social	Its Systemic/Organizational
E1 Atoms	Apprehension	Physic pleromatic	Galaxies
E2 Molecules			Planets
E3 Prokaryotic	Irritability	Protoplasmic	Gaia system
E4 Eukaryotic		Vegetative	Heterotrophic ecosystems
E5 Neuronal organisms	Sensation	Locomotor	Societies with division of work
E6 Neural cord	Perception		Societies with division of work
E7 Reptilian brain	Impulse	Uroboric (undifferentiation)	Groups/families
E8 Limbic sistem	Emotion	Typhonic	Groups/families
1 Neocortex (triune brain)	Symbols-representations Instinctive self	Survival sense Archaic Archaic vision Clans of survival 100,000 y. 0 - 18 m.	Hunter and gatherer Stone age (homo habilis 2.5 millions y.) Lithic techniques Fire (300,000 y.), Tools revolution
2 Complex Neocortex	Concepts Magic self	Familiar spirits Magic Animist-magic Tribal/villages Ethnic tribes 70,000 y. Cognitive revolution 50,000 y. 1 - 3 y.	Horticulture and pastoralism. Neolithic revolution (10,000 - 9000 y.) Neolithic, polished stone tools: 10,000 y., pottery and weaves (9000.). Cooper Age (8000 y.) Agricultural techniques, domestication (11,000 y.: wheat, goats) Primitive vulgar arts
3 Structure-function 1	Rules-concrete operations Mythic	Power gods Empires (7,000 years Egypt) Feudal Empires Impulsive self 10,000 y. 3 - 6 y. Exploiter Empires Mythic primal	Scripture 5500 y. History beginning. Bonze age (4000 y.) Iron age (3200 y.). Money (5000 y.) Agrarian Minor/major arts
4		Force of Truth Mythic order Mythic evolved First nations, Polis (2500 y.) Rule-role Authoritarian 5000 y. 7 - 8 y.	Major Arts
5 Structure-function 2	Formal-operations Formal Achiever	Progressive impulse Rational Scientific-rational. Nation-state Corporative states Achiever Capitalist democracies 300 y. 9 - 14 y.	Print press Scientific revolution (500 y.) Industrial revolution Steam machine Technique Design

Continued

6 3	Vision-logic (Pluralist Meta-systemic) Sensible	Human bonding Centauric Pluralistic Planetary Personalist Vicarious experience (Graves) Communities of value/fluid organizations Social democracy 150 y. 15 - 21 y.	Revolution of information Arts of media and communication Social networks
7 4	Post-formal (Vision-logic Paradigmatic) Integral emergent	Flexible flow Systemic Common integral 50 y. Centered in the world	Existential arts Integral theory
8	Symbolic (Vision logic Inter-paradigmatic) Integral mature	Holistic vision Holonc Holistic meshwork 30 y. Existential Wholeness Mind and spirit	Technologies/ Existential arts Artificial intelligence

Relevance for personal development.

We presented (Table 3) the potential personal development in an art. This evolution begins with the dominion of a set of rules and/or interpretive parameters, starting as beginner or novice. The direction points to acquire “mastery”, arriving step by step to the level of master/teacher. Note that the word master (from *magister*) is more related in its etymological meaning with *tekhne* than teacher, but teacher acquired in English also the same meaning. A developed master/teacher can relate the art with life, develops from the art that dominates a vital philosophy, makes of the artistic logic a meaningful part of his/her life. Teaching in the corresponding art help teachers in their self-realization. Novices in the art learn from the teacher the vital relevance of the art, and for this feel strongly attracted towards learning it in depth. This attraction is called “vocation” (a kind of call) and has anthropological and psychological roots. Consequently *tekhnes* have also relevance to the evolution of the “subjective”.

Metaphysical relevance

By creating new objects or artifacts, human groups, at the same time and in different places, understood the act of creation. The “artist” (Aristotelian) knows the relationship between the creator and the creation. In the physiosphere and biosphere is immediate the question: “Who created all of this?” “How is animation possible?” From the logic of *tekhnes* the creative-active dimension of the entire cosmos can be understood, because the human thought of a *tekhne* can be projected more broadly to the reality as a whole. The relationship artist-artifact can be projected easily to the relationship between Creator-creature in natural “objects”. The basis for a meaningful part of the metaphysic thinking is founded

in this kind of consciousness. The Creator is in the creation but is not the same than the creation, however part of Him is in it. Although metaphysics in Aristotle was part of the *episteme teoretike*, the active knowledge of the interobjective sphere provides the model and possibility to understand the dynamics of metaphysical systems. This knowledge can be useful to understand metaphysics, without presupposing that a personal belief system is better than other, or can be applied in the possibility of understanding equivalences between diverse metaphysical systems.

Epistemological relevance

Wilber presented the different epistemologies in the four quadrants of his system. By considering the interior and the exterior of each quadrant, eight zones were created that define the different epistemological traditions (Helfrich, 2008):

- Top left quadrant UL (Subjective intention)

Zone 1: Introspection, Phenomenology

Zone 2: Structuralism

- Lower left quadrant-LL (intersubjective cultural systems)

Zone 3: Hermeneutics

Zone 4: Cultural Anthropology

- Right upper quadrant—UR (Objective behavior)

Zone 5: Autopoyesis

Zone 6: Empiricism, Behaviorism

- Right lower quadrant-LR (Inter-objective social systems)

Zone 7: Social Autopoyesis

Zone 8: Ecological Sciences, Systems Theory, Anthropology

Aligned with the approach developed for the interobjective quadrant, social autopoyesis doesn't seem clear, because this quadrant was redefined as the quadrant of the relational group-knowledge. Alternatively this quadrant can be characterized epistemologically with the preponderance of the developed *tekhne* logic. Zones 7 and 8 in coherence with this development can be redefined:

Zone 7, interior:

Interpretative tradition, authority in a field, Aristotelian art. E.g. Psychoanalysis (Spence, 1994). Includes criticism, rationality, artistic production (not only aesthetics, but functional, sensorial, social, cultural, ethical, etc.). The rational dialectic exercise (Toulmin et al., 1984). The Design Based Research (Bereiter, 2002) is an appropriate methodological approach for this zone.

Zone 8, exterior:

Ecological Sciences. Theory of Systems. Complexity Theory. Integral Theory.

Relevance to Education

A relevant and central conclusion from the characterization of the interobjective and from the evolutionary descriptions of the *tekhnes* is that Education is a *tekhne*, an irreplaceable *tekhne* that makes possible all the other. Education can be understood as the process by which the mind of the group passes into the in-

dividual mind (Vygotsky, 1980).

In particular the *tekhnes* are very relevant in all kinds of professions. Effectively any professional “know how” shares this kind of *tekhne* oriented thinking. Because of this presence and importance, as well as their meaning in the development of humanity from prehistoric times, is very important that *tekhne* logic becomes a meaningful part of Education. In addition we live today in a universe where the mass media have a crucial influence as creators of collective group representations. Mass media use more Rhetoric and Aristotelian *tekhne* ways of thinking than logical-scientific ones. The same can be said about the today influence of publicity, sports, entertainment industries, etc. On the other hand leadership is also an *art* in this Aristotelian conception. The same happens with many fields and the most part of practical/productive approaches.

These *tekhne* logic related perspectives and ways of thinking are present in contemporary societies. Therefore they have to be present in Education, to understand professions, human groups, and the group human ways of constructing knowledge and group-thinking. All the professions, as we explained, can be understood as *tekhnes*, and in contemporary professions the creative problem solving and the social construction of knowledge are crucial. Because of that reason the creative problem solving, as well as the product invention, are more and more present in present-day Education (Doak et al., 2013). That’s the reason why the “learning by doing”, proposed by Dewey and other thinkers and educators of the “nouvelle schools”, is so meaningful in Education. In addition, as if that were not enough, Education as a profession is itself a *tekhne of theknes*.

This advocating for *tekhne* logic doesn’t has to be misinterpreted as an anti-scientific stance. The argument is that other dimensions have to be added to “modern” curricula and worldview. The possibility of subjective development, on one side (personal dimension), and on the other side what we can denominate as the *tekhne* logic dimension (the artistic logic), have to be included in Education at the same level than scientific oriented competences, as Gardner proposed, by providing the scientific framework for that inclusion (Gallifa, 2016).

Finally this rationale has also a socio-economical correspondence: “Globally, creative industries are estimated to account for more than 7 per cent of the world’s gross domestic product and are forecast to grow, on average, by 10 per cent a year” (Zuhdi, 2014: p. 197). Education, definitely, needs promoting and developing the *tekhne* logic thinking; through Arts Education.

5. Final Remark and Conclusions

We developed the *tekhne* logic way of thinking, an intellectual endeavor that requires rationality. Aristotle introduced it and it’s a necessary part to complement integral visions. Otherwise the comprehensive *Sophia* would be limited. Effectively the suppression of the Aristotelian views brought a limitation: The reductionism of the theory-praxis. Without *tekhne* the knowledge was reduced

to *episteme teoretike* and *praktike* (*phronesis* oriented), translated as theory and praxis (the *phronesis* aim is *praxis*). Because praxis is also synonymous with practice, it was probably thought that the epistemic possibilities had been exhausted, although *praxis*—in Aristotle—means to think about the perfection of the agent, as in moral and ethics. With the binomial theory-practice the *tekhne* or the knowledge of group was underestimated, despite that it was the basic form by means of which humanity developed. Nevertheless in Modernity the humanity continued developing intensely *tekhne* thinking, but without the framework of rationality that surely would be appropriate, and the *tekhne* remained on the margins of the “intelligentsia” and the university and therefore was marginalized in the intellectual Education of young people, who are the elites of tomorrow. The *tekhnes* were maintained in a diminished tone and in the less considered manual professions or in the fine arts. The logic and rationality of the arts were lost or diminished, and at the same time the same happened with the rationale of the creative acts that, in turn, are behind the metaphysical frameworks. These circumstances, among other reasons, caused the limitation of the modern soul and the opening of the paths to postmodernity. After the fragmentation and postmodern pluralism, comprehensive approaches are required and to accomplish this proposal the *tekhne* logic needs to be recognized, reconsidered and promoted.

The Wilber’s Integral Theory has been reexamined with the *tekhne* logic perspective in mind. The *tekhne* logic has been proposed as the organizing element of the interobjective quadrant. The unit in this area is the human ability, skill or competence (i.e. manual, verbal, thinking related, etc.). It requires an imagined final state and a process of transformation that is adapted until reaching the achievement of the purpose or *telos*. The process needs teaching and learning processes. This interobjective field explains the representational knowledge of a group and the nature of the intentional action. This was the way that hominization followed (tools, signs), and this was the process that contributed to humanization (technological revolutions, symbols).

From this comprehension different consequences have been detailed. Among other: the epistemological framework for the Design Based Research and other *tekhne*-related methodologies, the understanding of the evolution towards “mastery” or the comprehension of vocation, human will and freedom. Otherwise these dimensions would have no appropriate placement in comprehensive approaches, needed today in many fields. The perspective makes justice to the human action, the human work, creativity and to the knowledge of a group. In the society of knowledge where we live, “knowledge of a group” has a broader meaning than scientific knowledge, without diminishing the importance of the last one. A *tekhne* logic approach requires in addition pragmatic considerations. This is how arts (Aristotelian) work.

It has been explored the possibility of elevation of the consciousness applying existential *tekhnes*: the knowledge of a group intended to develop self-knowledge

and personal development. The *tekhne* logic is the appropriate framework to understand and explain “spiritual exercises” or “existential” work in comprehensive approaches.

Especially meaningful is the relevance of this development in Education where the *tekhne* logic is consubstantial to their essence and evolution. Education in Arts is central and necessary to develop the *tekhne* logic. On the other hand the personal evolution in a particular *tekhne* is an adequate framework to understand what characterizes a master/teacher, and the necessary relationship that the *tekhne* logic has with the meaning of life of an authentic teacher.

Better comprehension about the means with which humanity developed, and the processes of transfer from group to individuals, help to understand human evolution and revolutions as well as the impact in the developmental processes. Knowing the *tekhne* logic helps to understand and manage the human transformational processes. Education is at the center of these transformations. The *tekhnes* can be useful in the elevation of consciousness and in understanding the today taking place *tekhne*-logic revolution.

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