

**Synaesthesia, Multiple Literacies,
And Communication Media**

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Abstract:

The author draws upon both historical and modern studies of synaesthesia as well as her own experiences as a synaesthete to explain what this mingling of the senses is, what it is not, and how it ties to media psychology. From the possibility of synaesthesia having led to humans forming sounds, words, and language we are led to an exploration of multiple literacies. Literacy has been historically limited in definition, but found a resurgence of exploration in the 1980s and 1990s as people attempted to broaden it to fit specific technologies. The various aspects of literacy are investigated as well as literacy's ties to synaesthesia and importance to media psychology.

Synaesthesia, Multiple Literacies, and Communication Media

1.0 Synaesthesia

“If man is a being afloat in an ocean of vibrations, then all vibrations are possible. Why not a synthesis? Why not a transposition of the neurons?”

(Maurice De Fleury as quoted in Duffy, 2001, p. 79).

Following decades of being brushed off by scientists, synaesthesia, “joined sensation”, realized a new place in the scientific community starting with a 1989 synaesthesia textbook and followed by Richard E. Cytowic’s book *The Man Who Tasted Shapes* in 1993 (Cytowic, 1995). Synaesthesia now gains regular references in the mass media such as BBS reports on synaesthetes and related online quizzes. Articles show up in Google’s news alerts as much as two to three times per week, and associations for synaesthetes and the study of synaesthesia have formed both virtual and physical communities. While the medical community has known about synaesthesia for three centuries, the subject was often passed over due to its interior and subjective nature which made it a difficult topic for non-synaesthetes to understand or, in some cases, believe (Cytowic, 1995). Occurring mainly in “females and non-right-handers,” synaesthesia is passed genetically and is “a normal brain process that is prematurely displayed to consciousness in a minority of individuals” (Cytowic, 1995; np).

In addition to being a normal brain process, some research points to synaesthesia being a sensation experienced by all infants (Ackerman, 1990). “Newborns ride on intermingling waves of sight, sound, touch, taste, and, especially, smell” (Ackerman, 1990, p. 284). This “neonatal hypothesis” explains how the synaesthetic connection will fail to be “pruned” from a juvenile brain if the “X-linked dominant genetic mutation” is inherited whereas the majority “prune” the

connection (Cytowic, 2003). Cytowic (2003) suggests that quieting “the chatter of the cognitive mind” enables one to “become aware of our ever-present synaesthesia” and recommends that adults use meditation to experience this sensory mingling. The “neonatal hypothesis” fits with findings by Gestalt psychologists that even adults without synaesthesia will “identify certain sounds with certain shapes in ways that fall into clear patterns” (Ackerman, 1990), thus hinting at the possibility that everyone continues to possess some level of synaesthetic ability or a memory of infantile associations.

For those who remain synaesthetic into adulthood, the links between memory and synaesthesia are reportedly strong (Duffy, 2001). Duffy (2001) states “those with colored-word and colored-alphabet synaesthesia often report being good spellers, since they ‘see’ the words written in color with the words located in space, either outwardly or inwardly” (p. 68). One extreme example is the thirty-year study by Russian psychologist A.R. Luria of a synaesthetic man “who had such strong synaesthesia that he *could not* forget anything” (Duffy, 2001, p. 68).

Other popular cases of synaesthesia can be found in the arts. Authors such as Baudelaire, Rimbaud, Nabokov, Faulkner, Woolf, and Joyce join composers such as Aleksandr Scriabin and Nikolai Rimski-Korsakov in the halls of famous synaesthetes (Ackerman, 1990). While some interpret synaesthesia itself as being a cause for “artistic” nature, the artists known for having synaesthesia were famous not for their cross modal senses, but for the art they produced (Cytowic, 1995). In some cases it seems the artist’s synaesthetic representations were only noted after the interest in synaesthesia peaked, rather than having been the cause of popularity, and synaesthetic correlations may have been discovered during a specific attempt to find artistic synaesthetes.

As the various ways of cataloging synaesthesia evolved from collecting stories to studying genetics, the tools used to study the phenomenon also advanced up to

the point of scientific results showing a decrease in blood flow to areas of the brain during synaesthetic processing (Cytowic, 2003). These advances challenge not only popular thought on synaesthesia, but also concepts of how the brain works (Cytowic, 2003). In addition to the scientific and neurological community's interest in synaesthesia, this phenomenon is a part of the lives of at least 1 in 2,000 people (Cytowic, 2003). With a number of varied studies, Cytowic (2003) estimates that synaesthesia could be as common as occurring in 1 in 200 or even 1 in 20 people.

Based on studies of synaesthetes, a number of sets of sensory crossing have been identified (Cytowic, 2003). In addition to the various pairings synaesthesia can create, around 40 percent of synaesthetes encounter multiple forms of synaesthesia, which adds to the diversity of experiences among synaesthetes (Cytowic, 2003). Even within these identified pairings, synaesthetes experiencing the same pairing will experience different responses (Cytowic, 1995). "For instance, hearing a doorbell might make one person see brown and gray triangles drifting off to the right as they fade; a dog's bark might produce shimmering circles moving out from the center for another; and the woosh of a furnace ignition might produce a stack of colored lines for a third" (Cytowic, 2003, p. 234).

Below is a chart from Cytowic's (2003, p. 233) updated edition of *The Man Who Tasted Shapes* that identifies individual synaesthetic pairings compiled by Sean A. Day, Ph.D., from 365 cases. (The list is no longer available on the web page referenced in Cytowic's book.)

Table 3. Types of synesthesia (n=365)	
Colored graphemes	66.8%
Colored time units	19.2%
Colored musical sounds	14.5%
Colored general sounds	12.1%
Colored phonemes	9.6%
Colored musical notes	10.4%
Colored personalities	4.4%
Colored tastes	6.3%
Colored pain	4.4%
Colored odors	5.8%
Colored temperature	2.2%
Colored touch	1.9%
Sound → touch	2.7%
Sound → taste	2.7%
Sound → smell	1.1%
Sound → temperature	0.5%
Taste → hearing	0.3%
Taste → touch	1.1%
Touch → taste	0.5%
Touch → smell	0.3%
Touch → hearing	0.5%
Vision → taste	1.9%
Vision → hearing	1.1%
Vision → smell	1.1%
Vision → touch	0.8%
Smell → sound	0.3%
Smell → touch	1.1%

While synaesthesia is a sensory experience, people with synaesthesia don't need a Christmas tree or an ocean to smell pine or salt water. Though they are consistent within individuals (Cytowic, 2003), the reactions of synaesthesia are not so predictable as the common societal associations of a Christmas tree smelling like pine or the ocean smelling like salt. These examples of memories tied to the senses could be based either in a broad social context or in a smaller social circle,

while synaesthesia is unconditioned. For example, when asked to associate a smell with a photograph of the sun shining down upon the Gastineau Channel in Juneau, Alaska, people who have lived in Juneau will answer differently than those who have not. Anyone who has not lived in Juneau will probably think of clean, fresh air blowing off of the water or the scent of damp earth and warm trees in the Tongass National Rainforest. However, anyone who has lived in Juneau in August, when the sunlight does glisten upon the channel, would not be able to avoid the thought of the heavy scent of salty, rotting salmon lining the shores and permeating the highway. Neither of these associations is synaesthesia, but both show how memories can be fused with senses and affect the interpretation of a current experience.

One distinguishing mark of synaesthesia is that it creates a double perception. Seeing a red car on TV could make one synaesthete taste cinnamon. The taste does not replace the red car, but the visual image of red literally induces the taste of cinnamon. A photo of a cinnamon stick resulting in the sensation, or memory, of smelling or tasting cinnamon is not a short cut to inducing an involuntary physical mingling of the senses. Showing a picture of an object, with the intention of inducing an idea of the smell that in actuality the object does emit, to artificially induce synaesthesia will not work. While some people may remember the scent of the object based on the photo, this is simply bringing forth memories and associations of that object and cannot be classified as synaesthesia.

In Luskin's (1998) *Task Force Report* examples of media-induced, or replicated, synaesthesia are given as feeling sea sick at the sight of a rocking boat, getting goose bumps from looking at a painting of snow, or smelling or tasting food seen in a picture. People experiencing a synaesthetic response would be more likely to see shapes or feel colors while looking at the image of snow, or the color white, than to feel cold. A feeling of cold upon seeing snow may be only a memory or a socially

learned experience. One must wonder if someone born and raised in Florida or Hawaii would be as likely to feel cold upon watching a movie set on ice fields as someone from Michigan or Canada. While it is a known experience in our society that snow is cold, without having experienced it, it is unlikely the body would react with goose bumps. While the example of snow imagery is a memory-based experience, being motion sick upon watching a moving horizon, a boat bobbing on an open sea, or even the film *Blair Witch Project* with its shaky camera work is a normal response to visual disturbance. If one begins to feel motion sickness while riding in a car, one needs only to close one's eyes or watch the road straight ahead to relieve the feeling. How then is the same experience relayed on film (a visual experience) anything different from the visual experience the film imitates?

While these media representations will work to affect sensations among the majority, synaesthesia is a trait held by the minority and not something that can be forcibly or intentionally induced. By definition synaesthesia "(Greek, *syn* = together + *aesthesis* = perception) is the involuntary physical experience of a cross-modal association" (Cytowic, 1995; np), not just "a multi-sensory response to various audio visual elements in the new media" (Luskin, 1998, p. 85). A better banner under which to study the *Task Force Report's* sensory reactions to media would be Cytowic's (2003) term "sensory fusion."

"In order to differentiate the perceptual trait [of synaesthesia] from metaphor, deliberate contrivances like *son et lumière* or odorama, or conceptual ideas of sensory fusion, I distinguished five characteristics: Synesthesia is (1) involuntary and automatic, (2) spatially extended, (3) consistent and generic, (4) memorable, and (5) affect-laden" (Cytowic, 2003, p. 236).

Synaesthesia's affect on media, media's influence on synaesthetes, the popularity of synaesthesia in the media, and the interest in induced sensory fusion

by new media are all relevant topics to be investigated by media psychology. The 2004 Fourth Annual National Conference of the American Synesthesia Association, Inc., in November brought up a number of important topics from recent synaesthetic study (American Synesthesia Association, np) that could be a good starting point for future research on synaesthesia. Speakers covered web-based studies of synaesthesia, how ways of seeing “impact our interpretations of works of art,” contemporary synaesthetic artists, new research on synaesthesia’s forms, and the prevalence of synaesthesia in specific populations (American Synesthesia Association, np).

2.0 Multiple Literacies

*“We are coming around again full circle: our literacies again
match more fully the multimodal nature of human perception”*

(McLellan, 1988, p. 194).

It is fortuitous, if not poignant, that the fields of multiple literacies and synaesthesia are being simultaneously broadened. Along with the surge to reinvestigate synaesthesia (Ackerman, 1990; Cytowic, 1993; Cytowic, 1995), the opportunity to redefine literacy was well covered in the 1980s and 1990s (Castells, 1996; Kwasnik, 1988; McLellan, 1988; New London Group, 1996; Reynolds, 1988; Warschauer, 1999). The emergence of new media has continuously changed the way people communicate and forced the learning of new technologies to continue participating in the ever-changing communication culture. From the first time humans scratched an image on a rock, uttered sounds, mailed a letter, sent an SMS, or synced their digital date books, humans have constantly evolved to understand each other through new tools. Paralleling the recent evolutions of media is the

definition of literacy, which has been updated in a variety of forms to keep pace with the tools of communication.

For many people, the term literacy may bring to mind reading and writing. However, “the concept of literacy is fluid and changes depending on the historical and social context in which it is considered” (Kwasnik, 1988, p.127). A review of literacy is not complete without the inclusion of its formation by and effects on society and technology. The Greeks used visual literacy as a way to recall the progression in oral storytelling, placing objects or areas in a mind map to trigger the next aspect of a tale (McLellan, 1998). Interestingly, Cytowic (2003) compared the initial distrust of synaesthesia in the scientific community to that of people being able to visualize things in their mind’s eye. The scientific confirmation of this ability came when researchers tracked the amount of time it took for the person visualizing a room to go from one location to another (Cytowic, 2003).

In the Middle Ages *litteratus* was the “ability to read, understand, compose by diction, make verse, and express him or herself in the Latin language” (Kwasnik, 1988, p.128). While there have always been many facets of literacy, since the printing press and spread of the printed word literacy has been focused on the linearity of print through reading and writing (McLellan, 1988). Writing, printing, and words themselves are still only technologies of communication. We now find ourselves surrounded by multiple phrases attempting to segment the aspects of literacy most important to today’s societies: information literacy, visual literacy, computer literacy, media literacy, oral literacy, digital literacy, technology literacy, and metamedia literacy are some of the terms that emerged in an attempt to combat the limited interpretation laid upon ‘literacy’ and apply it to a modern world.

Rather than having a segregation of applications for literacy, modern communication tools require an integration. The New London Group (1996) coined the term multiliteracies to encompass rather than segregate “the multiplicity of

communications channels and increasing cultural and linguistic diversity in the world today” which expand the requirements of literacy. As Castells (1996) states, the internet “for the first time in history, integrates into the same system the written, oral, and audio-visual modalities of human communication” (p. 328).

“By implicitly and explicitly establishing a social hierarchy between literate culture and audiovisual expression, the price paid for the foundation of human practice in the written discourse was to relegate the world of sounds and images to the backstage of the arts, dealing with the private domain of emotions and with the public world of liturgy.” (Castells, 1996, p. 327)

In the return to audio-visual and oral integration in modern communication, computer applications began the resurgence of symbol systems in communications media (McLellan, 1988). McLellan (1988) cited nine common symbol systems as being: oral-pictorial, written-pictorial, oral-written, mathematical-graphical, procedural-graphical, arithmetic-pictorial, musical-graphical, verbal-spatial, and logical-pictorial. Hypertext is also connecting communication to the many aspects of literacy, with the features of flexibility, interactivity, participation, and gathering of groups reminiscent of oral literacy (Warschauer, 1999).

“Many writers have claimed that network-based digital technologies are particularly congruent with many non-Western and oral cultures. They have pointed out that new technologies are restoring our attention to imagery and visual communication that predates the print era (Bolter, 1996) and that is prominent in many non-Western cultures” (Lemke, 1998).

With the reemergence of oral and visual literacies in new media, we are once again combining the senses to make meaning. If synaesthesia is a trait we are all born with, but one that is lost during development (Cytowic, 2003; Ackerman,

1990), perhaps the communication tools of humans traveling full circle back to its origins and including the use of many senses rather than partitioning them will create an exercise for children's synaesthetic abilities. Perhaps less people will lose their synaesthesia when they grow up around media that use most of the senses already and have the means of expanding to include more.

A BBC *Horizon* show on synaesthesia (np) brought up the idea that synaesthesia could have been the root of all language. The theory presented on the BBC show that sounds, later forming words, may have been developed based on synaesthetic ideas of what the objects actually sounded like to the pre-language humans (BBC *Horizon* transcript, np) could mean that synaesthesia was more popular among pre-language humans.

“PROFESSOR VS RAMACHANDRAN: Just as you have synaesthesia within sensory areas you also have the propensity to mimic hand movements with lip and tongue movements. Now this is probably because the hand and the mouth area are right next to each other in the brain and there is some cross activation of the kind you see in synaesthesia. What I am claiming is that there is a non-arbitrary mapping between the hand gestures and unconscious lip and tongue movements. For example *un peux*, diminutive, teeny weeny, tuna in Indian language versus *enormous*, large where the lips actually mimic what the fingers are doing and I don't think that's a coincidence.”

(BBC *Horizon* transcript, np)

Ironically, this would mean that the use of synaesthesia to create language actually led to partitioning off the synaesthetic functions of the brain once language and the printed word became the core of society.

In A.R. Luria's studies of remote, non-literate groups in comparison to literate groups, he found that literate people divided ideas into cause and effect,

using abstract thinking and hypothetical explanations, while non-literate people used their perception of actual situations (D'Angelo, 1982). Luria's conclusion was that non-literate groups were able to make judgments about themselves or things directly concerning themselves, "but when they are asked to turn to a system of theoretical thinking that is divorced from a practical situation and that depends on linguistic, logical thinking, they fail to make the necessary inferences" (D'Angelo, 1982, p.163). Considering that some of the nonliterate responses included replies such as "We don't talk about what we haven't seen" (D'Angelo, 1982, p.160), I would argue that the nonliterate population *chose* not to apply personal experiences as overall, abstract, judgments for others; not that they *failed* to do so.

However, the concept that literate and non-literate groups interact with the world in different ways and actually separate ideas based on their level of literacy applies not only to literacies, but also synaesthesia. D'Angelo (1982) quotes Heinz Werner's 1948 text *Comparative Psychology of Mental Development* to explain the way non-literate people were distinct from the literate group in their separation of mental events into discrete perceptions: "on the sensory level, seeing, hearing, feeling, tasting, and smelling are closely related so that a specific stimulus will not only arouse a corresponding sense, but may arouse related senses" (p. 156). This information supports the hypothesis that non-literate groups have easier access to synaesthetic responses, this time based on Luria's 1931-1932 studies of a non-literate population. Is written literacy actually an inhibitor of synaesthesia's development, and if so how does that relate to the famous artists, composers, and authors of synaesthetic fame?

In opposition to seeing literacies as limitations, Kwasnik (1998) argued that literacy is "but *one aspect* of knowledge, or progress, or human development" (p. 128). Kwasnik (1998) defined four categories of literacy to emphasize its reach in society: "Literacy as a *primary academic skill*," "Literacy as a *cognitive* and

developmental factor,” “Literacy as inextricably embedded in a *social context,*” and “Literacy as an *abstract concept*” (p.129). Kwasnik’s first category, literacy as an academic skill, is sometimes seen as the full interpretation of literacy. In this case a literate person would need only to be able to “recognize shapes as letters, identify groups of letters as words, match up words to a known lexicon of words, and so on” (Kwasnik, 1998, p.129). This tier of literacy also applies to technological literacy in the form of knowing how to operate hardware or software, use a telephone, install a DVD player, or navigate the internet. However, according to Kwasnik (1988) this is only one portion of literacy, which when added to the remaining three categories reveals the complete cultural implications of literacy.

Distinct from “common sense” knowledge, the cognitive and developmental category of literacy “enables us to free ourselves from the constraints of concrete and specific thinking (Kwasnik, 1988, p.130). Instead, we are able to think conceptually and to make imaginative connections that do not necessarily occur in real time and space” (Kwasnik, 1988, p.130). This tier of literacy also enables humans to communicate with one another by bringing the “human interior to the exterior world” (Kwasnik, 1988, p. 132).

Kwasnik’s (1988) third tier of literacy, social context, applies to power, progress, and civilization. The hardcopy record created by written literacy enabled “proof” of events and agreements through documentation as well as a written rather than oral history of civilization (Kwasnik, 1988). In addition, political involvement and dissent are based on the public’s right to information about the government through the media, thus making multiple literacies key components to political involvement (Kwasnik, 1988). “Literacy (like education) is *always* a political event; it is always connected to language, politics, and consciousness” (Kwasnik, 1988, p.131).

Perhaps the most influential aspect of Kwasnik's tiers when related to new media is the abstract concept. The ability or skill of literacy is of little use when one does not know how or why to apply the skill (Kwasnik, 1988). Mental processes are needed to understand the capabilities of the tools as well as how they are used, "the ability to see a problem in its parts *and also* as part of a system" (Kwasnik, 1988, p.136). Information processing skills, in addition to the primary academic skills of literacy, include selection of and ability to reject data, process information in the mind, envision solutions to problems based on the abilities of available tools, and learn new tools (Kwasnik, 1998). Not only does the abstract concept affect the use of new tools, such as being able to envision how to use a database to organize information and apply it, but it also encompasses the personal filtering of information from both the media and other sources such as public records, internet sites, and individuals.

"The information about what to look for and the knowledge about how to use the message will be essential to truly experience a system different from customized mass media. **Thus, the multimedia world will be populated by two essentially distinct populations: the *interacting and the interacted***, meaning those who are able to select their multidirectional circuits of communication, and those who are provided with a restricted number of prepackaged choices" (Castells, 1996, p. 371).

Information overload is a popular term used to describe the stress associated with an inundation of information associated with modern societies and the resulting feelings of being overwhelmed (Rosenberg, 2003). A similar phenomenon was experienced in eighteenth century Europe and was coined an "information explosion" (Rosenberg, 2003). The overwhelming information of that time period came in the form of books (Rosenberg, 2003) rather than the current electronic

resources. The perception of overload was created by more books being printed than one could read, too many descriptive facts contained in published materials, and perhaps even the abundance of indexes and encyclopedias created to “‘contain’ information overload” (Rosenberg, 2003).

Modern fears of information overload may lead to individuals choosing to be “the interacted,” thus limiting the available information to something that appears manageable. Kwasnik (1988) points out that “the computer’s ability to generate large quantities of data has been popularly accepted as one of its marvels, rather than one of its serious drawbacks” (p. 140). The ability to understand the available sources of information, to be able to reject data, and have the skills available to interpret and create communication (Kwasnik, 1988) are all aspects of literacy crucial to modern society. Rosenberg (2003) found that “in discussions of contemporary culture, it is at least as common to hear expressions of ecstasy as of unease with the rush and flow of information” (p. 1). I would attribute the different reactions, whether people associated the abundance of information with positive or negative (overload) feelings, to differing success levels with multiple literacies.

Feelings of information overload in relation to personal literacy levels, the relation of multiple literacies to synaesthesia, and the reemergence of oral and visual literacies through the applications of new media are all topics for future media psychology research. Another interesting application of media psychology could be the development of literacy classes, along the lines of media literacy taught in some schools already, to aid in the understanding of and ability to use current resources. With a psychological approach, courses may be better designed to balance the skills and applications needed for a complete literacy rather than only emphasizing academic skills.

Discussion

As someone who works in the technology field, it is something that I am very comfortable with – even reliant on to the extent that I would be uncomfortable without the ability to run an internet search on recipes when preparing a meal. I see the internet as my own vast, and relatively inexpensive, library. On the other hand, I often encounter people who are afraid to use computers, and much more afraid of the internet. This makes sense in relation to learned helplessness and lack of multiple literacies. This seems like something positive psychology, cognitive-behavioral intervention, or media literacy courses could prevent or change in those who feel they are not capable of making computers work properly. While these individuals encounter a lack of intuitive knowledge about a computer or program, thus assuming they are the cause of not being able to operate the system, I think it actually takes that stumbling around to learn the systems.

Another important aspect in the processing of information is design. With ancient arts such as Feng Shui concentrating on aesthetics for healthier living, why is it the modern world is just now coming to this conclusion with scientific tests? Donald A. Norman (2004) explores examples of how and why design helps us to function better in his book *Emotional Design*. Norman (2004) cited a study done in Japan and Israel showing that ATMs with the same information were easier to use when they were attractive. This leads me to wonder if the attractive ATMs are easier to use because they instill a sense of ability or optimism in the user that encourages use rather than feeling they are lacking the skills of technological literacies needed.

With literacies' return to including multiple senses, design and synaesthesia become an important part of media psychology by encompassing and relating to the senses. When synaesthetes experience a mingling of the senses, their memories of that experience are strong. Perhaps this trait can be built upon to enable stronger

memories of our experiences through the use of media for non-synaesthetes by activating more than one sense at a time. While media may not be able to create or cause synaesthesia, the study of synaesthesia may result in useful connections for media psychology.

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