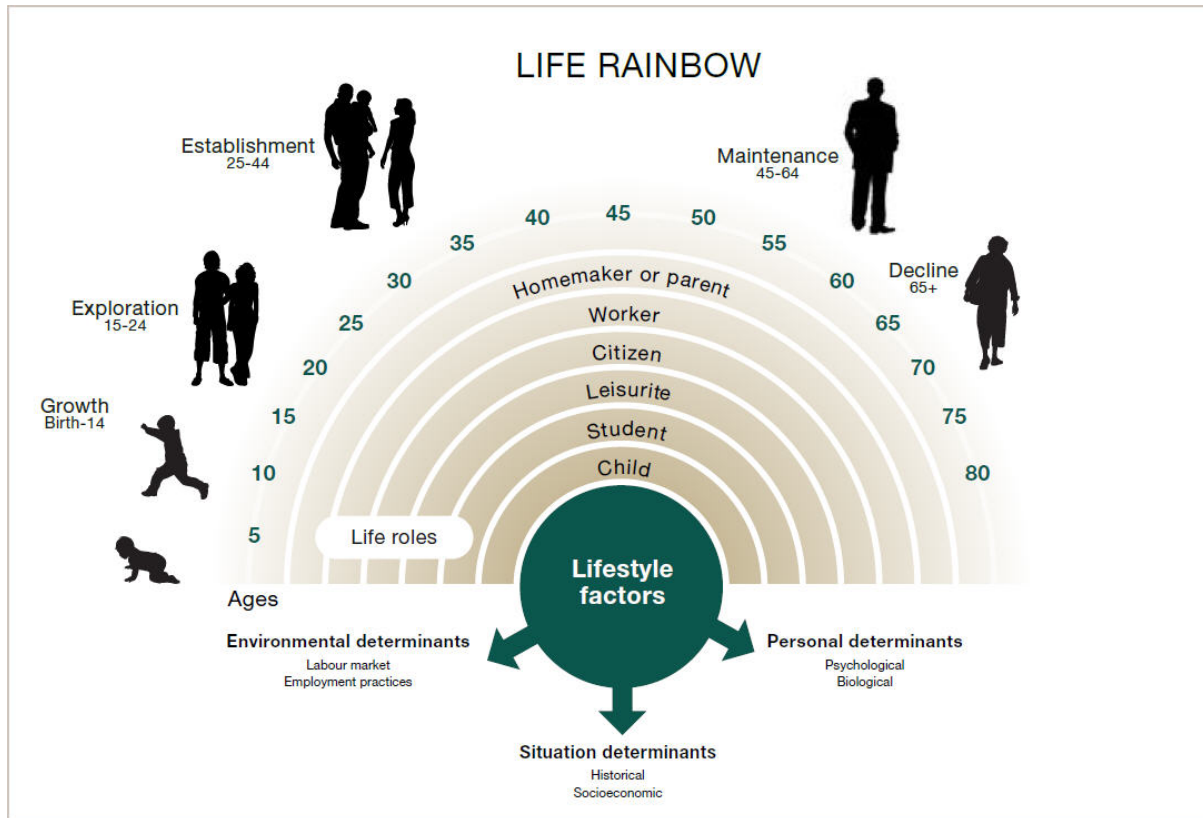


Donald Super

Developmental self-concept

Donald Super's career model is based on the belief that self-concept changes over time and develops as a result of experience.



One of Donald Super's greatest contributions to career development has been his emphasis on the importance of the development of self-concept. According to Super, self-concept changes over time and develops as a result of experience. As such, career development is lifelong.

Super's five life and career development stages

Super developed the theories and work of colleague Eli Ginzberg. Super felt that Ginzberg's work had weaknesses, which he wanted to address. Super extended Ginzberg's work on life and career development stages from three to five, and included different sub-stages.

Stage 1: Growth	Age 0–14	Characteristics: Development of self-concept, attitudes, needs and general world of work
Stage 2: Exploration	Age 15–24	Characteristics: "Trying out" through classes, work experience, hobbies. Tentative choice and skill development
Stage 3: Establishment	Age 25–44	Characteristics: Entry-level skill building and stabilisation through work experience
Stage 4: Maintenance	Age 45–64	Characteristics: Continual adjustment process to improve position
Stage 5: Decline	Age 65+	Characteristics: Reduced output, prepare for retirement

Developmental tasks at the different stages

Super argues that occupational preferences and competencies, along with an individual's life situations all change with time and experience. Super developed the concept of vocational maturity, which may or may not correspond to chronological age: people cycle through each of these stages when they go through career transitions.

Decline

In adolescence:

Giving less time to hobbies

In early adulthood:

Reducing sports participation

In middle adulthood:

Focusing on essentials

In late adulthood:

Reducing working hours

Maintenance

In adolescence:

Verifying current occupational choice

In early adulthood:

Making occupational position secure

In middle adulthood:

Holding one's own against competition

In late adulthood:

Keeping what one enjoys

Establishment

In adolescence:

Getting started in a chosen field

In early adulthood:

Settling down in a suitable position

In middle adulthood:

Developing new skills

In late adulthood:

Doing things one has wanted to do

Exploration

In adolescence:

Learning more about opportunities

In early adulthood:

Finding desired opportunity

In middle adulthood:

Identifying new tasks to work on

In late adulthood:

Finding a good retirement place

Growth

In adolescence:

Developing a realistic self-concept

In early adulthood:

Learning to relate to others

In middle adulthood:

Accepting one's own limitations

In late adulthood:

Developing and valuing non-occupational roles

Carl Jung

 simplypsychology.org/carl-jung.html

Saul McLeod, published 2014

Carl Jung was an early supporter of Freud because of their shared interest in the unconscious. He was an active member of the Vienna Psychoanalytic Society (formerly known as the Wednesday Psychological Society). When the International Psychoanalytical Association formed in 1910 Jung became president at the request of Freud.

However in 1912 while on a lecture tour of America Jung publicly criticized Freud's theory of the Oedipus complex and his emphasis on infantile sexuality. The following year this led to an irrevocable split between them and Jung went on to develop his own version of psychoanalytic theory.

Most of Jung's assumptions of his analytical psychology reflect his theoretical differences with Freud. For example, while Jung agreed with Freud that a person's past and childhood experiences determined future behavior, he also believed that we are shaped by our future (aspirations) too.

Differences between Jung and Freud

Assumption	Jung	Freud
Nature and purpose of the libido.	A generalize source of psychic energy motivating a range of behaviors.	A source of psychic energy specific to sexual gratification.
Nature of the unconscious.	A storehouse of repressed memories specific to the individual and our ancestral past.	A storehouse for unacceptable repressed desires specific to the individual.
Cause of behavior.	Past experiences in addition to future aspiration.	Past experiences, particularly in childhood.

Theory of the Libido

Jung (1948) disagreed with Freud regarding the role of sexuality. He believed the libido was not just sexual energy, but instead generalized psychic energy.

For Jung the purpose of psychic energy was to motivate the individual in a number of important ways, including spiritually, intellectually, and creatively. It was also an individual's motivational source for seeking pleasure and reducing conflict

Theory of the Unconscious

Like Freud (and Erikson) Jung regarded the psyche as made up of a number of separate but interacting systems. The three main ones were the ego, the personal unconscious, and the collective unconscious.

According to Jung, the ego represents the conscious mind as it comprises the thoughts, memories, and emotions a person is aware of. The ego is largely responsible for feelings of identity and continuity.

Like Freud, Jung (1921, 1933) emphasized the importance of the unconscious in relation to personality. However, he proposed that the unconscious consists of two layers.

The first layer called the **personal unconscious** is essentially the same as Freud's version of the unconscious. The personal unconscious contains temporality forgotten information and well as repressed memories. Jung (1933) outlined an important feature of the personal unconscious called complexes. A complex is a collection of thoughts, feelings, attitudes, and memories that focus on a single concept.

The more elements attached to the complex, the greater its influence on the individual. Jung also believed that the personal unconscious was much nearer the surface than Freud suggested and Jungian therapy is less concerned with repressed childhood experiences. It is the present and the future, which in his view was the key to both the analysis of neurosis and its treatment.

However, by far the most important difference between Jung and Freud is Jung's notion of the **collective (or transpersonal) unconscious**. This is his most original and controversial contribution to personality theory. This is a level of unconscious shared with other members of the human species comprising latent memories from our ancestral and evolutionary past. 'The form of the world into which [a person] is born is already inborn in him, as a virtual image' (Jung, 1953, p. 188).

According to Jung, the human mind has innate characteristics "imprinted" on it as a result of evolution. These universal predispositions stem from our ancestral past. Fear of the dark, or of snakes and spiders might be examples, and it is interesting that this idea has recently been revived in the theory of prepared conditioning. However more important than isolated tendencies are those aspects of the collective unconscious that have developed into separate sub-systems of the personality. Jung called these ancestral memories and images archetypes.

Archetypes

Archetypes (Jung, 1947) are images and thoughts which have universal meanings across cultures which may show up in dreams, literature, art or religion.

Jung believes symbols from different cultures are often very similar because they have emerged from archetypes shared by the whole human race. For Jung, our primitive past becomes the basis of the human psyche, directing and influencing present behavior. Jung claimed to identify a large number of archetypes but paid special attention to four.

The “persona” (or mask) is the outward face we present to the world. It conceals our real self and Jung describes it as the “conformity” archetype. This is the public face or role a person presents to others as someone different to who we really are (like an actor).

Another archetype is the **anima/animus**. The “anima/animus” is the mirror image of our biological sex, that is, the unconscious feminine side in males and the masculine tendencies in women. Each sex manifests attitudes and behavior of the other by virtue of centuries of living together. The psyche of a woman contains masculine aspects (the animus archetype), and the psyche of a man contains feminine aspects (the anima archetype).

Next is the **shadow**. This is the animal side of our personality (like the id in Freud). It is the source of both our creative and destructive energies. In line with evolutionary theory, it may be that Jung’s archetypes reflect predispositions that once had survival value.

Finally, there is the **self** which provides a sense of unity in experience. For Jung, the ultimate aim of every individual is to achieve a state of selfhood (similar to self-actualisation), and in this respect, Jung (like Erikson) is moving in the direction of a more humanist orientation.

That was certainly Jung’s belief and in his book “The Undiscovered Self” he argued that many of the problems of modern life are caused by “man’s progressive alienation from his instinctual foundation.” One aspect of this is his views on the significance of the anima and the animus.

Jung argues that these archetypes are products of the collective experience of men and women living together. However, in modern Western civilization men are discouraged from living their feminine side and women from expressing masculine tendencies. For Jung, the result was that the full psychological development both sexes was undermined.

Together with the prevailing patriarchal culture of Western civilization this has led to the devaluation of feminine qualities altogether, and the predominance of the persona (the mask) has elevated insincerity to a way of life which goes unquestioned by millions in their everyday life.

Critical Evaluation

Jung’s ideas have not been as popular as Freud’s. This might be because he did not write from the layman and as such his ideas were not as greatly disseminated as Freud’s. It may also be because his ideas were a little more mystical and obscure, and less clearly explained.

On the whole modern psychology has not viewed Jung's theory of archetypes kindly. Ernest Jones (Freud's biographer) tells that Jung "descended into a pseudo-philosophy out of which he never emerged" and to many his ideas look more like New Age mystical speculation than a scientific contribution to psychology.

However, while Jung's research into ancient myths and legends, his interest in astrology and fascination with Eastern religion can be seen in that light, it is also worth remembering that the images he was writing about have, as a matter of historical fact, exerted an enduring hold on the human mind.

Furthermore, Jung himself argues that the constant recurrence of symbols from mythology in personal therapy and in the fantasies of psychotics support the idea of an innate collective cultural residue. In line with evolutionary theory it may be that Jung's archetypes reflect predispositions that once had survival value.

However, Jung's work has also contributed to mainstream psychology in at least one significant respect. He was the first to distinguish the two major attitudes or orientations of personality – extroversion and introversion. He also identified four basic functions (thinking, feeling, sensing, and intuiting) which in a cross-classification yield eight pure personality types.

Psychologists like Hans Eysenck and Raymond Cattell have subsequently built upon this. As well as being a cultural icon for generations of psychology undergraduates Jung, therefore, put forward ideas which were important to the development of modern personality theory.

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The Politics of Arrested Development: Deepening the Purposes of Education

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ARTICLE

The Politics of Arrested Development: Deepening the Purposes of Education

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“Every man has inside himself a parasitic being who is acting not at all to his advantage.” William S. Burroughs (n.d.)

Some Notes on the Flow of U.S. History

How do you turn the voters of the world’s lighthouse democracy against their elected government? How do you convince the mass of those citizens to deny themselves basic human rights and economic security?

In terms of its politics, America is often called a center-right nation. This analysis stirs approval in allies of the right, and remorse in those of a progressive bent. If correct, the label describes a voting public that is generally less prone to get out in front of change and to instead value constancy and tradition. As evidence of this disposition, one can argue that the last era of sweeping political reform in America was President Lyndon B. Johnson’s Great Society, which fought wars on poverty and discrimination. *Roe v. Wade* (1973) followed shortly thereafter, along with the creation in the early 1970s of the Environmental Protection Agency (EPA) and the passage of the Occupational Safety and Health Act (OSHA). Since 1980, however, there has been a notable retrenchment of this type of reformist instinct, and the political tide has shifted. The decline of unions and the rise of income inequality are indices of this trend. Also noteworthy are struggles with minority educational achievement, limits on abortion rights, rising bankruptcies due to health-care costs and under-regulated financial practices, and an inability to manage immigration. At the same time, military and security costs remain extremely high. At the university level, government support of public institutions continues to decline with commensurate tuition increases. For public schools, government funding is diluted by privatization initiatives, and policy is steered by a centralized system of standards and testing (Shaker & Heilman, 2008). Teachers, along with other state workers, find themselves vilified for their middle-class compensation.

Culturally, there are progressive achievements, such as the rising integration of gay Americans in society and (white) women’s achievements in the professions and politics. The internet has grown in an open and largely unimpeded manner. Popular acceptance of our ethnic diversity seems to advance. As to political progressivism, a second president in 220 years has been elected who is not a white, Anglo-Saxon, Protestant male. A tentative next step has been taken after Medicare to assure universal medical care. Gay rights in the military have been secured.

Although America is a bastion of economic opportunity and cultural expression, it has allowed poverty and inequality to ebb and flow; it is still in many ways racially segregated; and its social safety nets pale in comparison to those of many European nations, and to those of Australia, Canada, and Japan. All this is of concern to educators because our professional values center on transforming as well as transmitting, society’s values. Since the Progressive Era, we have evolved as a reformist field. At the same time, since we orient toward change, our institutions and we ourselves are the objects of revanchist politics: The politics of the right include breaking tenure and unions for teachers, issuing vouchers that can be taken to private and charter schools, and encouraging home schooling. There are also efforts to deregulate teacher preparation, including lowering academic requirements. The autonomy and professionalism of the classroom teacher are challenged by curriculum standardization and evaluation by standardized testing.

America is caught up in massive social problems that could be addressed by policy initiatives. The Sixties showed us that rights for women and minorities could be expanded; that Medicare is a viable concept; that focused government programs could reduce poverty. Free or low-cost public higher education was a reality. Today our challenges include providing for the deficiency needs of all children; making health care a human right in America; accommodating our immigrant population; asserting the popular will over lobbyists, including particularly those of the defense industry and Wall Street; protecting the middle class; and developing a demilitarized foreign policy. The evidence of the past several decades is, however, that our government is broken and divided; that we are unable to respond to our major problems. The efforts of reform are watered-down (like the recent health-care initiative), or dependent on deficit spending (like Medicare’s drug benefits), or devoid of substantive content (like No Child Left Behind), or dead in the water (immigration reform).

This essay is an effort to explain the stagnation of our politics by placing it in the context of human development, a central goal of education. Although this unfolding takes place in each individual, the story of each, multiplied by millions, can contribute to an understanding of our collective politics. If America is, indeed, a center-right nation politically, dominated

most often by a preference for constancy and tradition and resistant to change and transformation, there must be cultural reasons for this preference. Nations vary, and one narrative seems not to fit them all.

The Wayward Path of Ego Development

“For now we see only a reflection as in a mirror; then we shall see face to face.” (New International Version Bible, 2011; Corinthians 1:13)

There is a standing joke that children learn to speak spontaneously and that this skill is learned more effectively than reading, which we teach in school with the help of trained professionals. Setting this familiar dismissal of educators aside, let’s instead pose this parallel question: Why do children mature physically into adults with little coaching, but psychological health and development come about haltingly and imperfectly? Why is it apparently innate to speak but not to read, and to develop our bodies to maturity, but not our psychological side? One answer is that physical growth, as well as oral communication, is governed by genetics and instinct so that children put in an environment that meets minimal standards of interaction and nutrition will experience these types of development with little conscious intervention. On the other hand, reading and psychological maturation have less to do with instinct and more to do with enculturation. The social interactions that cause such growth to unfold is much more specific and complex. So complex, in fact, that contemporary society tolerates widespread illiteracy and evidence of chronic psychological maladaptation. Among the latter indices are antisocial behaviors such as violence, and self-destructive actions such as addiction. *What kind of education is necessary for an individual’s psychological development and search for a meaningful life?*

The key process of psychological maturation up through adolescence can be summarized as the emergence and strengthening of the *ego*. This concept, when applied to psychological experience, is commonly seen as our conscious choice-making faculty and our sense of individual identity. The ego emerges through a process of *identification and differentiation* whereby individuals gradually adopt from their social environment an outline of attributes they identify with and ones they see as differing from their own. The categories that are sorted in this way range from gender to ethnicity, race, nationality, religion, and so on. These categories go from the profound, such as spiritual orientation, to the trivial, such as the sports teams whose jerseys one wears. As is well known, there is a black-and-white and intolerant character to early ego formation. A cultural environment, like a school or family that is itself marginally developed will be unable to explain for individuals the insight that identifying with one category should not entail hostility to the categories that are set aside: Patriotism need not become chauvinism, for example; religious zeal ought not to spawn sectarian intolerance. Such conflicts are, sadly, only too common; so common, in fact, that rejection is normal in the sense that persons feel hostility to those others who occupy categories with which they do not identify. Prejudice and intolerance are, sadly, only too normal. In schools and social media, common manifestations of this Manichaeism are scapegoating and bullying.

The ego is characterized not only by differentiation, but also by identification, and individuals adopt the notion that the ego is what they are and who they are. That is, they identify their being and humanity with the ego, the choice-making and differentiated dimension of psychological experience. They believe that their personhood is the same as their ego. Self-consciousness emerges with the onset of the ego, and it is understandable that in the process of psychological maturation we would, therefore, go through a stage of development where we confound the two. Through the ego, we first come to have a sense of personhood; it is the original sense of individuality and separation from the parents. The linkage between ego and self-consciousness is more than simply an overlay of timing, however. Since the mechanism of ego is to invite identification, there is also an invitation to stasis at this point in the process of maturation. The power and utility of the ego are obtained by differentiating oneself from the larger environment and identifying with a limited set of distinct categories of being. It isn’t obvious to a person that letting go of the strategies and values that created the sense of individuality and free will would promote growth. To put it in the language of Erik Erikson, “The strength acquired at any stage is tested by the necessity to transcend it in such a way that the individual can take chances in the next stage with what was most vulnerably precious in the previous one” (1963, p. 263).

This change in self-consciousness away from identification with the ego and its exclusionary character is a transformation. The insight to let go of the associations that have created self-consciousness in order to advance self-consciousness is not straightforward or linear. In religious terms, it is a second birth. Also to employ religious insight, this transformation is best sustained by a commitment to compassion. Compassion as a gateway to enlightenment is a recurring theme in the work of Karen Armstrong. For example, “All the sages preached a spirituality of empathy and compassion; they insisted that people must abandon their egotism and greed, their violence and unkindness” (2006, p. xiv). In theory, the insight is simple: By loving thy neighbor, one breaks the dominance of the ego and opens to further growth, along the lines of

Kohlberg's Stages of Moral Development (1981). Compassion, valuing the other, is a foundation of self-consciousness without animosity. In practice, however, we know that human society is rife with egotism, greed, violence and cruelty. The ego is not so easily transcended. For schools, this insight has special meaning, since it lends a profound rationale for compassion as a fundamental value in classrooms.

Jung offers the concept of the *Self* to define a focus for one's personhood that goes beyond the issues of the ego (Jung, 1960, p. 134). The difference between ego and Self is illustrated by the terms *identity* and *entity*. Ego evolves from infancy around a principle of either/or. It identifies with some aspects of experience and disidentifies with others. Ego builds on differentiation. Self for Jung represents a feeling of wholeness and autonomy that welcomes experience broadly. The Self accepts for consideration those experiences that are alien to it. The Self does not reflexively identify with experiences formerly seen as integral to the person. It sees those perceptions often as transitory elements of ego. The Self allows the individual to have autonomy, that is, a withdrawal from external identifications. The opportunity is created for experiencing oneself as an entity, a unique being, more than the sum of the world's actions on himself or herself.

Think of the feeling of choice restriction that occurs in dreams. Just as the ego struggles to assert itself in dreams, so does the Self try to express itself in waking life. It has been said that life is a dream of the Self. We have the impression that at our fingertips are actions that would free us to a richer experience of life. Some unseen force, however, has oppressive power over us. Our better insights are suppressed, and often we feel as though we were witnesses watching our own lives being played out before us. So much of our science and art are expressions of rebellion against this unknown force of suppression. Could this be the parasitic being of which Burroughs spoke?

Society's Miseducative Schooling

The *ego* remains entrenched due not only to internal states of attachment and continuity, but also by external factors. Social networks and media at least as powerful as those that advocate for transformation argue for the static point of view. There is no shortage of groups, including those that are based in patriotism, ethnicity, or faith, that advocate for identity through differentiation, exclusion, and feelings of superiority. There is a multifaceted establishment dedicated to propagating stasis. Since humans are profoundly social and affected by the social environment, these institutions and organizations are powerful purveyors of what Dewey called *miseducation*. In his definition, those experiences that inhibit the process of continuous growth are miseducative (Dewey, 1938/1963). The techniques that are employed to bolster the ego and cling to an attitude of identification with a similarly minded subgroup include, for example, encouraging negative emotions toward *the other*, such as fear and anger. Also, there is support within the group for positive feelings of grandiosity, supremacy, superiority, and holiness. Then there are totems or symbols of worship such as flags, religious icons, and guns. Additionally there are slogans like *love it or leave it, my country right or wrong, the right to life, drill, baby, drill*. And there are jargon and buzzwords that carry symbolic meaning: *socialism, evolution, freedom, big government, and liberal*. Of course there are explicit entities marked out as *other*, such as Arabs, Muslims, socialists, multiculturalists, feminists, illegal immigrants, atheists, *The Democrat [sic] Party*. Homosexuality has proved to be one of the most powerful of contemporary litmus tests. Acceptance of gay rights continues to rend religious groups and other organizations. All this is evidence that ego consciousness is resourceful and resolute in its quest for dominance of the psyche. People in groups organize entire movements to shelter and support their points of view. It's no wonder that change toward a gentler, more inclusive social order is halting and that the process is often subverted. Schools are frequently caught in the middle of the conflict: obliged by law to recognize human rights that are widely challenged within the social world of parents. This divide haunts curricula treating sex education and gender and affectional issues.

The power of the *status quo* cannot be underestimated in human affairs, and this bias exists for good reason. Human civilization is fragile and the costs of disruption include war, chaos, disease, and starvation. Transformation is by definition a leap, a radical reordering of fundamental values and practices in society, and it can result in a Great Leap Backward as readily as an Enlightenment, or a Robespierre rather than a Jefferson. Life without change, on the other hand, is fraught with its own perils that are well documented in history, including extinct civilizations and defunct or co-opted social movements.

Ego Traits and False Equilibrium

Jean Piaget commented in an educational context on the phenomenon of developmental intransigence (1937/1954). Let us recall that to Piaget, *assimilation* is an immediate response to new circumstances with old strategies, and *accommodation* is a long-term change to our concepts brought on by new stimuli. In Piaget's language, here is an explanation of how the

ego is confronted by new challenges to its legitimacy and responds with denial and rejection:

Why then, does this accommodation remain, in the true sense of the word, superficial, and why does it not at once lead to correcting the sensory impression by rational truth? Because, and this is what we are leading up to, primitive accommodation of thought... is undifferentiated from a distorting assimilation of reality to the self and is at the same time oriented in the opposite direction. (Gruber & Vonèche, 1995, p. 293)

In other words, rather than a new synthesis arising in the form of a useful accommodation, a primitive accommodation takes place. This accommodation is, in Piaget's terms, a "distorting assimilation," i.e., a false assimilation. In this process, an unhealthy response to a growth-oriented concept, such as *someone who is different from you is not necessarily a threat to you*, is met with rejection. This rejection is a reflexive, thoughtless egoistic response that, sadly, is taken to heart as a proper and healthy response. The new concept is added to the list of rejected values that define the ego. An expansive accommodation, that is, an expansion of respect and tolerance, is never seriously contemplated. The growth process is arrested.

Jung describes this phenomenon in this way: "Naturally, in these circumstances there is the greatest temptation simply to follow the power-instinct and to identify the ego with the self outright, in order to keep up the illusion of the ego's mastery" (1960, p. 134).

Piaget (quoted by Duckworth) brings this response into the world of education in this statement:

...This is a big danger of school--false accommodation which satisfies a child because it agrees with a verbal formula he has been given. This is a false equilibrium which satisfies a child by accommodating to words -- to authority and not to objects as they present themselves to him. (Duckworth, 1964, p.174)

Here the mechanisms of egoistic response are taken to another plane. The authority of the institution itself facilitates distorting assimilation and false accommodation. If the miseducative words come from an apparent authority, they have a greater chance of affecting the person, since they play on a penchant for the *status quo* with all the credibility that institutional authority has with the student. Whether coming from a priest, teacher, politician, television commentator, or other authority figure, the words are given greater power to influence. Implicit in Piaget's insight is his criticism of the lack of critical awareness in this example. He suggests that taking these words on faith is an accommodation based not on reflection and insight, but on authority. In this example we can see why jargon repeated by authority figures in the media would have significant influence in steering listeners toward stasis. Critical thinking never enters the equation as the reflexive response patterns of the ego are employed to reinforce its dominance of the individual psyche.

Analysis is replaced with labeling in this process. Instead of an argument for or against something, the act of labeling is deemed a sufficient response. Common labels include, *socialist, liberal, ideological, racist*. Language is used as a fixed icon, rather than as a living conveyance for communication, compromise, and meaning.

Whether in certain media that parrot people's prejudices back to them, or in some religious schools that encourage a cult of in-group superiority, we find this mechanism at work. In such schools, inquiry and analysis are subordinated to orthodoxy and sectarianism with a resulting inhibition of growth and maturation. Being told with certitude that one is *right* and *superior* has proved to be a popular, if unfortunate, message.

Four Ways of Looking at the World

Arrested development goes beyond the issues of ego and Self into other qualities of maturation. In describing his theory of the psyche, C. G. Jung described four cognitive functions or ways of experiencing the world and our inner life: *Thinking*, which is associated with logical analysis; *Feeling*, a rational application of personal values to experience; *Sensing*, the direct and deep response to sensory data; and *Intuition*, a disposition to give high priority to insight and the future implications of events. As students of the Myers-Briggs Type Indicator (MBTI, 1962/2011) know, these functions are paired to give four core types: NF (Intuition/Feeling), NT (Intuition/Thinking), SF (Sensing/Feeling), and ST (Sensing/Thinking). The commonest core type among American men is ST, and, for women, SF predominates. Up to three-quarters of all Americans are oriented to the Sensing function, as opposed to the Intuitive. About two-thirds of American men prefer Thinking to Feeling. For American women, Feeling dominates, about two to one. Intuition accounts for a third or less of Americans (Center for Applications of Psychological Type, 2011).

In brief, this suggests that Americans who are Sensing types tend to relate to experience more often through concretia, as

opposed to abstractions (favored by Intuitives), and to give present events more weight than the future implications of events. Men and women have converse relations to Thinking and Feeling, with men much more oriented to a logical, but impersonal approach, and women setting aside logic in favor of commitment to a hierarchy of values. Political power, of course, has been largely in the hands of men, at least overtly, and the ST core type has become the dominant perspective in American politics. The ST worldview is at home with the center-right perspective associated with U.S. politics. An appropriate slogan for this population is, *if it works, don't mess with it*. Society is considered to be working unless there are pressing immediate crises happening for the voters themselves. Long-term, slow-developing problems (like peak oil or climate change) have little purchase. Rolling suffering that affects a significant few at any given time (such as bankruptcy from medical bills) is similarly undervalued until bad luck brings misfortune to one's own doorstep. Statistical literacy is trumped by magical thinking. In other words, by this logic, regardless of probability, people can plan for the lottery to provide for their retirement, while assuming that medical bankruptcy won't strike their family. Belief and optimism displace analysis and an understanding of probability. Rather than deliberate government policies to extend reliable safety nets, voters opt for low taxes on the chance that they will be the lucky, healthy multimillionaires who benefit.

If one, as a Sensing type, gives little priority to long-term consequences, transformation has little appeal. This conservational tendency contributes once again to the reinforcement of the ego, since it is the first vehicle of self-consciousness. At the same time, the Sensing disposition lessens the appeal of any transcendence that requires letting go and a radical reorientation of one's psychology. Strengthening and reinforcing what one has, in this case one's orientation to the ego, is a more attractive alternative than inviting a new perspective: Continuity is preferred to change. Since the ego in itself is an abstraction, the concrete symbols, objectified language, and other markers described above carry the weight that material objects would otherwise convey. Persons do not look too deeply into what the slogans and buzzwords mean: They relate to them as iconic articles of faith, beyond analysis.

Fudjack and Dinkelaker (1995) present an in-depth look at the paths not taken in American life as a consequence of the majoritarian ST perspective. Their claim is that science and scholarship that are S and T oriented are far in advance of the undervalued F- and N- oriented fields. They write,

...the definitions of 'thinking' and 'sensing' that are in general usage reflect a comparatively higher level understanding, whereas what is normally meant by the words 'feeling' and 'intuition' refer to comparatively lower levels of accomplishment with respect to those functions.

Fudjack and Dinkelaker go on to describe five levels of development for Feeling and Intuition that parallel taxonomies for logical thought or the observation of sensory data.

This analysis is germane to the discussion of ego development because, without a sense of quality and progressive development in the Feeling and Intuitive functions, the costs of stasis are much less apparent. For example, level-four Feeling is described this way:

At level four, the essentially INTERPERSONAL [sic] nature of the individual's 'feeling field' is experienced...Our capacity to feel gives us direct access to the experience of 'oneness' with others. We experience reality as shared or 'consensual' by 'feeling with' or 'feeling into' those others - that is, through sympathy, empathy, and compassion. In other words, we learn to synchronize our underlying feeling states with those of other persons... (Fudjack & Dinkelaker, 1995)

If a person has no awareness or commitment to such an advanced stage of Feeling, there is no reason to expect the person to aspire toward it. Individuals without such an awareness or commitment experience no conscious loss in missing out on level-four Feeling.

In an analysis of Intuition, Andrew Dinkelaker (1997) offers "The Developmental Levels for F and N," including for Intuition these five descriptions:

1. Passively experiencing hunches and suspicions;
2. Recognizing meaning dreams, fantasies, imagining;
3. Deliberately utilizing brainstorming, reverie; creating symbols, acting outside given rules and norms;
4. Creation of new paradigms or systems; detecting anomalies;

5. Becoming the source of one's own meaning; the experience of undifferentiated consciousness.

One goal of this essay is to explore what Dinkelaker calls level-four Intuition, i.e., the idea that a great deal of societal potential is being missed by a lack of awareness and development of the F and N functions in contemporary America. This deficiency disposes society to set as an ideal success that is achieved only in the realms of S and T, that is (1) material acquisition, (2) research in the hard sciences, and (3) technological accomplishment. Fundamental to this imbalanced approach is the dominance of the ego in its present form, which is one of S and T preeminence to the exclusion of the other functions and their potentialities. The implications for educators are many, beginning with the need for curriculum that examines lifespan developmental psychology and proceeds through understanding of type differences and the strengths and weaknesses of each core type's point of view. Another priority would be focused efforts at illustrating cause- and-effect relationships in science, politics, and history. The desirability of greater literacy in statistics and probability would also be indicated.

Channeling the Feeling Function

To get further insight into what is missing from the dominant viewpoint in American politics, we can examine Fudjack and Dinkelaker's levels of the Feeling function:

1. Repression of emotions that in turn erupt as sentimentality and emotionality;
2. Recognition of various emotions experienced subjectively and with varying intensity and brought on by outside events;
3. Emotion as tacit context or field of all experience; invitation to process and reflect on emotions;
4. Emotional fields are communal; opportunity for empathy and compassion;
5. Experience of the interdependence of all beings.

The spate of crying outbursts in late 2010 by politicians, particularly John Boehner, comes to mind as a vivid example of level 1. It is difficult to imagine a clearer example of this state. With appropriate irony, it surfaced among those whose politics so demonstrate a denial of the Feeling function in general. Glenn Beck's tirades are another model of undifferentiated and unspecified emotionality, loaded with affect but often at the same time without coherence. Jung, it may be recalled, labeled Feeling as a rational function along with Thinking. In other words, he saw the experience of Feeling as subject to reflection and analysis, whereas Sensing and Intuition are spontaneous in their character. In the view of Jung, we can come to our feelings, like we come to our thoughts, through a reflective process. Alternately, sensory data and intuitions arise in us. They can be recognized by reflection, but not analyzed in the manner we weigh feelings and thoughts. Education can raise our awareness and competence in relating to such experiences (Mayes, 2007).

At a conscious level, emotions are given short shrift in U.S. politics. During times of crisis, a few mournful and empathic words are shared, but public discourse quickly reverts to the logical and mechanistic with a notable absence of feeling states. The suggestion is we should not be influenced by the vagaries of feelings when making critical decisions. As level two suggests, however, not all emotions are equal in nature or intensity: To be sad is not to be depressed; there is a difference between loving a car and loving a person; one can feel moral outrage without feeling hatred.

U.S. politics has risen to a higher level during times of crisis when presidents are expected to speak out with healing messages. This processing of emotion, level three, is an elusive state in American public life. When the dust has settled and the soothing words fade, the public often reverts to the barricades of confrontation and mutual exclusion. We seem unable to sustain an attitude of continuing rapprochement and reintegration of our social context. The South African Truth and Reconciliation Commission is a stunning example of institutionalizing such a transcendent process. Rarely is such a commitment made in modern societies, although clearly there is a need for the mechanism, and it had considerable success when implemented under the leadership of Bishop Desmond Tutu.

The compelling challenge for U.S. society is to consider the wisdom of level four. Our egoistic worldview resists admitting our communal condition. Grudgingly we might admit we need each other to sustain the comforts of modern life, but we are less prone to recognize the way our emotional climate is a collective creation. We ultimately cannot escape the suffering of others. We are made to feel their pain through the costs of prisons, Medicaid, and mental health facilities, by crime and

terrorist attacks, and simply by their sorrowful presence among us. We act as though we can live securely in pockets of luxury while driving by those who are desperate in the streets. There is another point of view, however. To put it in positive terms, there is a beneficial impact on the lives of all in knowing that our society is limiting the suffering of the vulnerable. To the ego, compassion may be woolly-minded or bleeding-heart. On the other hand, we would see caring for others as enlightened self-interest if we were alert to the emotional climate we live in. It is another way that Self is discriminated from ego. Over the decades, this type of content has ebbed and flowed in the social studies curriculum. It has not, however, been adequately theorized and fit into a comprehensive model of the school's role in human development.

Conclusion

It is only a poor sort of happiness that could ever come by caring very much about our own pleasures. We can only have the highest happiness such as goes along with being a great man, by having wide thoughts and much feeling for the rest of the world as well as ourselves. (George Eliot, n.d.)

Looking around the world we can see that there is adequate wealth in advanced societies to provide freedom from want for all of each nation's citizens. Not only can food, shelter, and employment be guaranteed, but also education through university, medical care, and old-age security. For those interested in the welfare of all members of society, it is difficult to understand why in America, for example, the voting public insists on denying themselves these basic human rights. This essay has been an attempt to respond to this question through the insights of Jung's psychology and related studies, such as that of psychological type, specifically MBTI. Looking through this lens, several patterns emerge.

Jung categorized cognitive functioning through use of four terms: Thinking, Sensing, Feeling, Intuition. According to this analysis, in light of compiled data from the Myers-Briggs Type Indicator, American society favors Thinking and Sensing over Feeling and Intuition, particularly in its exercise of political power. A practical consequence of this imbalance is a preference toward present material gratification over long-term planning that would better account for emotional as well as material well-being. These preferences have resulted in practices like spending the Social Security Trust Fund rather than setting it aside in a lockbox; chronic deficit spending aggravated by an absolute commitment to tax reduction; an inability to move away from dependency on foreign oil; and the militarization of foreign policy and a de-emphasis of diplomacy in foreign affairs.

Extending this analysis, contemporary theorists speculate on how American society would change if the undervalued functions of Feeling and Intuition were consciously integrated with our public life. These theorists provide a hierarchy of development that would help establish balance in society. For example, a more developed appreciation of Intuition would open the world of aesthetics to wider audiences and provide more persons with the ability to experience the rewards of the fine arts and nature. The pursuit of pleasure is fundamental to humans and motivates many of our actions. It is not to be dismissed as incidental. Aesthetic experience can be a source of profound pleasure, accessible to all with informed sensibilities and at little material cost or cost to one's well being. More developed Intuition would also act to reconfigure our relationship between current gratification and appropriate planning for the future. The familiar miracle of compound interest might be taken more seriously than the failed god of the Laffer curve (Wanniski, 1998).

Most profoundly, however, is the assertion that our Feeling function should be honored and its application refined: "Emotional fields are communal." Whether from enlightened self interest, the desire to provide security for one's own family, or a Christian ethic of *love thy neighbor*, we need to come to a realization that our fundamental calling should be the alleviation of human suffering. Instead of resolving to make this our central societal goal, however, we treat suffering as something that happens to other people who are to blame for their fates. Educators must bear some responsibility for this failure to sort out our values and withdraw wrongful projections onto others.

This leads us to a final word on compassion. There is an ancient philosophical and spiritual insight that through care for others, we liberate ourselves. If we are not to be consumed by Burroughs' "parasitic being" within us, we must recognize the social foundations of our existence. The inflation of the ego can only be countermanded by an appreciation of our social nature and our debt to the community that sustains us. We honor that community by an ethic of care.

Our societal progress is halting. Although we have advanced in many ways, culturally, economically and politically, we remain at risk. Educators, as a profession, are vital to rebalancing and widening our sensibilities at a time when politics are stalemated and riven. There are values and insights that can guide our intervention and we must bring them into our world of teaching and learning.

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“Toward a Neuroscience of Adult Cognitive Developmental Theory”, excerpts

Progressing through the described cognitive stages, of which there are five in the case of CDT [Cognitive Developmental Theory], implies reaching higher levels of cognitive development. In doing so, individuals obtain novel perspectives and a dialectical manner of thinking, allowing them to approach ambiguity and conflict in more constructive and altruistic ways, both internally and in their interactions with others. In a related fashion, it can be theorized that deficiencies in these perspectives and techniques, or in other words a lack of advancement through the developmental stages, can result in a more self-centered and narrow worldview, an inability to deal with conflict, psychological distress, and in some cases the occurrence of psychiatric disease. ...

As argued by Musholt (2013a), it is important to distinguish between having conscious experiences (“being a self”), and being aware of oneself having conscious experiences (“being aware of being a self”). While the former can be a subjective experience, the latter requires an objectification of that experience. To use Kegan's CDT terminology, being a self is considered Subject while being aware of being a self is considered Object. In other words, while it is possible to simply have a subconscious perception of something, it requires a higher level of cognitive development to bring awareness to oneself having that particular perception, or to make Object what was previously Subject. Returning to the previous political example, it would require a higher level of cognitive development to bring awareness to holding a particular political viewpoint, as compared to simply holding that viewpoint and being subject to it. ...

Cognition has the potential to evolve over the course of adult life. As more complex ideas arise and varied perceptions come to light, newly discovered concepts present novel ways of approaching conflict and making meaning of everyday interactions. This is possible by bringing awareness to mental constructs that were previously in the subconscious, or making Object that which was previously Subject.

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Toward a Neuroscience of Adult Cognitive Developmental Theory

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Toward a Neuroscience of Adult Cognitive Developmental Theory

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Abstract

Piaget's genetic epistemology has provided the constructivist approach upon which child developmental theories were founded, in that infants are thought to progress through distinct cognitive stages until they reach maturity in their early 20's. However, it is now well established that cognition continues to develop after early adulthood, and several “neo-Piagetian” theories have emerged in an attempt to better characterize *adult* cognitive development. For example, Kegan's Constructive Developmental Theory (CDT) argues that the thought processes used by adults to construct their reality change over time, and reaching higher stages of cognitive development entails becoming objectively aware of emotions and beliefs that were previously in the realm of the subconscious. In recent years, neuroscience has shown a growing interest in the biological substrates and neural mechanisms encompassing adult cognitive development, because psychological and psychiatric disorders can arise from deficiencies therein. In this article, we will use Kegan's CDT as a framework to discuss adult cognitive development in relation to closely correlated existing constructs underlying social processing, such as the perception of self and others. We will review the functional imaging and electrophysiologic evidence behind two key concepts relating to these posited developmental changes. These include self-related processing, a field that distinguishes between having conscious experiences (“being a self”) and being aware of oneself having conscious experiences (“being aware of being a self”); and theory of

mind, which is the objective awareness of possessing mental states such as beliefs and desires (i.e., having a “mind”) and the understanding that others possess mental states that can be different from one's own. We shall see that cortical midline structures, including the medial prefrontal cortex and cingulate gyrus, as well as the temporal lobe, are associated with psychological tasks that test these models. In addition, we will review computational modeling approaches to cognitive development, and show how mathematical modeling can provide insights into how sometimes continuous changes in the neural processing substrate can give rise to relatively discrete developmental stages. Because deficiencies in adult cognitive development can result in disorders such as autism and depression, bridging the gaps between developmental psychology, neuroscience, and modeling has potential implications for clinical practice. As neuromodulation techniques such as deep brain and transcranial stimulation continue to advance, interfacing with these systems may lead to the emergence of novel investigational methods and therapeutic strategies in adults suffering from developmental disorders.

Keywords: cognitive developmental theory, self-related processing, theory of mind, Dynamic Field Theory, Research Domain Criteria

Introduction

The field of cognitive development was pioneered and largely developed by Jean Piaget in the early to mid 1900's. His approach to genetic epistemology, or study of the origins of knowledge, took a constructivist stance, in that he focused on how children used their ideas and social experiences to construct their reality over time. He defined several stages of development, of which the final stage was thought to conclude around the 25th year of life (Piaget, [1971](#)). However, many adults continue their cognitive development after their mid 20's, and as a result several theories have emerged to better characterize stages of *adult* cognitive development (Fischer, [1980](#); Basseches, [1984](#); Wilber, [2006](#)). The psychologist Robert Kegan developed and empirically tested one of the more prominent of these theories, termed Cognitive Developmental Theory or CDT (Kegan, [1994](#); Kegan and Lahey, [2009](#)).

CDT and other developmental theories deal with the nature of adult thought, the way in which it develops, and its implications in everyday life. As a result, the applications of these theories are numerous and span many domains, including business, education, spirituality, and medicine. Progressing through the described cognitive stages, of which there are five in the case of CDT, implies reaching higher levels of cognitive development. In doing so, individuals obtain novel perspectives and a dialectical manner of thinking, allowing them to approach ambiguity and conflict in more constructive and altruistic ways, both internally and in their interactions with others. In a related fashion, it can be theorized that deficiencies in these perspectives and techniques, or in other words a lack of advancement through the developmental stages, can result in a more self-centered and narrow worldview, an inability to deal with conflict, psychological distress, and in some cases the occurrence of psychiatric disease.

Despite the pervasiveness of these theories and commonality of their ideas, they have largely remained in the realm of the social sciences, namely psychology, sociology, and education. In order for them to permeate the neurosciences, however, investigations into these adult developmental concepts need to be transitioned from psychological methods to those of neural imaging, neurophysiology, and computational neural modeling. In essence, we pose the question: Could the cognitive developmental stages of Kegan be characterized by neurophysiologic states and neural network activity, and could neuroscientific methods be used to identify deficiencies therein? Answering this question would be the

first step toward finding methods to interface with these brain systems, both to help decode the underlying processes and eventually to attempt to modify pathological neural activity using neuroprosthetic devices.

While it is currently not possible to answer this question, as there are no dedicated imaging or electrophysiologic studies directly targeting adult cognitive developmental theory thus far, we will work toward establishing a framework in which to explore various hypotheses. First, using the proposition that several aspects of neural development mirror and coincide with cognitive development (Gu et al., [2015](#)), we'll look at structural changes in brain regions and connections in the progression from adolescence into adulthood. Next, we'll introduce Kegan's CDT, using a hypothetical example to better demonstrate its ideas, while exploring parallel concepts of the Research Domain Criteria. Then, we'll attempt to gain neuroscientific insights into CDT by examining the related concepts of self-related processing and theory of mind. Finally, we will have a look at how mathematical modeling shows promise in capturing and predicting developing neural networks.

Changes in structural brain networks

Human cognition is composed of large-scale networks that consist of brain regions that are functionally coherent at rest and collectively active during cognitive tasks (Dosenbach et al., [2007](#); Power et al., [2011](#)). These brain networks comprise a collection of neurons or brain areas and their connections, of which there are two general types: structural and functional. Structural connectivity entails the physical connection between different regions in the brain, while functional connectivity is the correlation or coherence of information between various regions of the brain over time. In addition, structural connectivity is believed to exert a causal influence over functional connectivity (Betz et al., [2014](#)), in that brain regions require a physical connection before they can work toward a common function.

Over the course of development through childhood to adolescence and eventually into adulthood, there are many changes in the organization of the structural brain network. Longitudinal MRI studies have shown that as children grow toward adolescence, parietal and frontal cortices thin and the temporal cortex thickens. There is also an increase in the overall number of neural nodes and white matter density during childhood, indicating increased connectivity, while they remain relatively stable during adolescence (Betz et al., [2014](#)). Furthermore, there are changes in structural connectivity within specific brain regions, as demonstrated elegantly using graph theory. In an analysis of over 200 normally growing children and adolescents (Khundrakpam et al., [2013](#)), primary sensorimotor connectivity decreased with age, while paralimbic and associative connectivity increased with age. More specifically, it was found that subjects in late childhood showed a relative reduction in the efficiency of local connectivity while there was an increased global efficiency. Potentially this may indicate that there is a time window of brain plasticity occurring during late childhood, one that may accommodate new developmental tasks faced during adolescence.

In addition to structural connectivity changes, there are also functional network connectivity changes throughout development into adulthood, as described in imaging and EEG studies (Anokhin et al., [2000](#)). fMRI studies show that there is an increase in network modularity and functional connectivity during adolescence and young adulthood (Marek et al., [2015](#)), and a decrease over the course of older adulthood (Betz et al., [2014](#); Cao et al., [2014](#)). This, as evidenced by decreased white matter connectivity, is hypothesized to account for cognitive decline in later years (O'Sullivan et al., [2001](#)). It is also possible that “developmental miswiring,” or deficiencies and abnormalities in functional connectivity during childhood, may account for developmental disorders and neuropsychological

conditions later in life (Di Martino et al., [2014](#)). For example, there is speculation that the decrease in delta oscillations during adolescence, as measured by EEG during sleep, may affect frontal cortex maturation and lead to the onset of schizophrenia (Feinberg and Campbell, [2010](#)).

Similar to and in relation to network connections in development, many cognitive processes are thought to be associated with specific cortical networks. The most commonly studied networks include the default-mode, attention, salience, cognitive control, motor, and auditory networks. While primary motor and sensory systems exhibit a high degree of separation and limited connections to other modules, high order cognitive networks have more between-module connectivity (Power et al., [2011](#)). As can be expected, these cognitive modules undergo significant changes throughout youth (Power et al., [2010](#); Satterthwaite et al., [2013](#)) and adulthood (Fair et al., [2009](#); Kelly et al., [2009](#); Supekar et al., [2009](#); Tian and Ma, [2017](#)).

The default mode network (more specifically the posterior cingulate cortex, medial prefrontal cortex, precuneus, insula) has been shown to be associated with progressively diminishing posterior attention networks throughout adulthood, with anterior to posterior as well as long-range connections disrupted most severely (Andrews-Hanna et al., [2007](#); Koch et al., [2010](#); Tomasi and Volkow, [2012](#)). It has been suggested that the decreased functional connectivity throughout aging (Damoiseaux et al., [2008](#)) has been correlated with the structural network changes in the default mode network (Liu et al., [2017](#)).

While these changes could be due to network decline, the structural and functional changes alternatively could be due to increased efficiency in these networks. However, the inability to suppress the default mode network as an individual ages has been associated with decreased performance on cognitive tasks (Persson et al., [2006](#); Damoiseaux et al., [2008](#)). Concomitantly, there is an increase in frontal and parietal activity with aging, which is hypothesized to be an inability to shift out of the default network to active cognitive processing (Park and Reuter-Lorenz, [2009](#); Mowinckel et al., [2012](#)). This may be evidence that as an individual becomes older, they use different neural networks for cognitive tasks, such as conflict resolution (Salami et al., [2014](#)).

Although several cognitive networks show decline into later adulthood, some can continue to develop and grow, such as task-positive networks (Mowinckel et al., [2012](#)). Cognitive control and salience networks have also been shown via fMRI to continue to increase into adulthood, in that functional changes in dorsal anterior cingulate cortex associated with error regulation increased in correlation with increasing age (Velanova et al., [2008](#)). In addition, networks associated with theory of mind and self-related processing are also associated with development, as will be explored in later sections. But, prior to exploring these concepts, we'll introduce and discuss CDT, as many of its ideas relate and apply to these cognitive processes.

Kegan's cognitive developmental theory (CDT)

Kegan's theory joins two separate philosophies, those of constructivism and developmentalism. Constructivists argue that individuals create meaning through their experiences rather than use their experiences to discover a pre-constructed meaning. In contrast, developmentalists argue that individuals cognitively progress and mature over the course of their lives. Constructive-developmentalists, therefore, believe that the systems people use to make meaning in their lives change and develop over time. Kegan ([1994](#)) adds that this growth is possible when one is able to reflect upon something in a fresh light and subsequently come to understand it in a different way, that is to take something that was once Subject and make it Object.

That which is Subject includes emotions, assumptions, beliefs, and the other ways in which people create meaning in their lives that are hidden within the subconscious. As a result, people are unknowingly shaped by and are unable to objectify these elements. In contrast, that which is Object are those elements currently available to our conscious mind, and as such, we are aware of them, able to reflect on them, and able to be in control of them (Kegan, [1994](#); Solms, [2014](#)). Kegan holds that moving an element from Subject to Object, that is, objectifying something to which one was previously subject, fuels cognitive development, in that the more one takes as Object, the more one can appreciate and understand, and the more complex one's overall outlook.

As someone's meaning-making evolves, so too do they progress through Kegan's five Orders of Mind, consecutive stages that indicate the complexity with which individuals construct their reality (Kegan, [1994](#)). Different orders of mind represent different levels of cognitive development, and therefore people in the different orders have different ways of viewing the world and dealing with conflict and ambiguity. While five orders or stages have been described, it is important to note that the majority of adults live in the third stage, some eventually reach the fourth stage, and only a handful ever attain the fifth and ultimate stage (Kegan and Lahey, [2009](#)). To demonstrate these orders of mind and their approach to dealing with conflict, we shall focus on stages three to five using politics as an example, and examine how a hypothetical person from each order of mind of a particular political party would construct their reality and deal with ideas and people of other political parties.

Individuals in Kegan's third stage of cognitive development possess a “socialized mind” (Kegan and Lahey, [2009](#), p. 17), meaning they shape their identities based on the guiding principles present in their personal environments, principles defined by people and institutions they hold in high esteem. In the case of our hypothetical political person, this environment would constitute their particular political party and its leaders, as well as personal acquaintances such as family and friends who share the same political attitudes. This third order person would therefore construct his political identity in order to cohere with the ideas, beliefs, and guidelines delineated by these people and the party. He would likely denounce other political views as incorrect, and avoid inter-political dialog altogether, except when undertaken with the aim of converting others to his own views.

A political person at the fourth order of mind is capable of the same thought processes as one at the third order, but in addition to this capability, also possesses a mentality that is more complex compared to her third-order counterpart. This is because she is able to “self-author” (Kegan and Lahey, [2009](#), p. 17) her own set of political beliefs, rather than rely on a higher institution to define these beliefs for her. This means that she has a political identity that is separate from that of the party, and as a result is no longer held captive by the opinions of that institution because those opinions have now become Object to her. Someone at the fourth order, by definition, is able to step far enough back from their surroundings, in this case the beliefs of their political community, to generate a personal authority on which to make decisions and evaluate claims (Kegan and Lahey, [2009](#), p. 17). In contrast to someone in the third order, she will not feel torn when facing the contradictions that are bound to arise when interacting with members of and discussing the tenets of other political ideologies.

A politician at the fifth order of mind operates within a self-authored political belief system, one that is comparable to that developed while in the fourth order. The crucial difference, however, is that he is now able to see the limits of this system, while his fourth-order counterpart could not. Similarly, the fifth-order comparative politician filters the teachings he comes across through the study of other political viewpoints, as he did while in the fourth order, but now he is able to perceive the filter itself as Object (Kegan and Lahey, [2009](#), p. 19). In other words, he is aware of his filter, can view it as separate

from his belief system, and as a result can assess the limitations and constrictions it places on his system as a whole. Furthermore, just as he is able to see the limits of his own system, so too is he able to appreciate the limits inherent to other systems, including those that are present in other political parties. In doing so, he formulates a “trans-ideological” (Kegan, [1994](#), p. 315) view of different political domains, and rather than take one political viewpoint to be correct and another as incorrect, he is able to gain a deeper understanding of both the costs and benefits inherent in the adherence to each one.

Therefore, as an individual progresses through the different orders of mind, concepts that were once in the subconscious transition to the conscious, and this in turn enables an evolution in the way that individual perceives themselves and their relation to others. While this theory of adult cognitive development does not aim to characterize or describe disease states, it is reasonable to assume that a lack of progression from one stage to the next, or in other words a deficiency in the elements required to move various perceptions and notions from Subject to Object, can contribute to psychological distress and potentially psychiatric disease. This hypothesis will be explored through concepts outlined in the Research Domain Criteria.

CDT and the research domain criteria

Psychiatric disorders have traditionally been classified based on symptom clusters and clinical phenotypes using the Diagnostic and Statistical Manual of Mental Disorders. However, an initiative pioneered by the National Institutes of Health aims to incorporate multiple methodologies in psychiatric nosology, including genetics, molecular biology, physiology, neural circuitry, and behavior. The Research Domain Criteria, or RDoC, is a framework aimed at using modern research to create a novel taxonomy for mental disorders, and contains five principal domains: negative valence systems, positive valence systems, cognitive systems, systems for social processes, and arousal/modulatory systems (Morris and Cuthbert, [2012](#)).

Within the RDoC framework, CDT most logically falls under the domain of social processes. As can be ascertained from the above example of a political person of different orders of mind, CDT argues that much of the meaning we make of our reality depends upon our interactions with others, both in our immediate circles of family and friends as well as society as a whole. Therefore, within the overall systems for social processes domain, CDT would lie specifically within the subcategories of the *perception of self* and the *perception of others*. To this end, the RDoC serves as a formalized structure for integrating the psychosocial aspects of development and cognition, within which to test various hypotheses and explore different ideas.

Because adult developmental theory currently lies largely in the realm of psychology, making the leap toward the neuroscientific realm with imaging and electrophysiological data must be undertaken gradually. Thus, we shall examine two key concepts relating to these posited developmental changes that already have a well-established basis in neuroscience: Self-related processing and Theory of mind.

Self-related processing

Having conscious experiences is a large part of what makes us human, and the study of self-awareness is a crucial component of social cognitive neuroscience. Over the past two decades, several functional neuroimaging studies have aimed at delineating the regions of the brain responsible for self-awareness and conscious experience. Cortical midline structures (CMS), including the ventral and dorsal medial prefrontal cortex, as well as the anterior and posterior cingulate cortex have repeatedly shown

involvement during tasks of self-assessment (see meta-analysis: Northoff et al., [2006](#)). These tasks range from simple, such as recognizing one's own body or body parts (Thirioux et al., [2010](#)), to more complex, such as making judgments about one's internal emotional state or abilities (Gusnard et al., [2001](#); Fossati et al., [2003](#); Schneider et al., [2008](#); Yaoi et al., [2009](#); Yoshimura et al., [2009](#)).

The study of mindfulness is also important to consider, as various meditative practices are aimed at bringing awareness to the self. Mindfulness meditation, of which there are many different types, can result in structural changes in the brain, such as increasing the cortical thickness of regions like the prefrontal cortex and insula (Lazar et al., [2005](#); Santarnecchi et al., [2014](#); Engen et al., [2017](#)). Neurophysiologic changes as measured through electroencephalography have also been shown to occur as meditators bring awareness to themselves, with distinct differences in EEG profiles depending on experience. For example, a study on Satyananda Yoga practitioners demonstrated that intermediate practitioners with a mean experience of 4 years had increased low frequency oscillations (theta and alpha) in the right superior frontal, right inferior frontal and right anterior temporal lobes, whereas advanced practitioners with a mean experience of 30 years had increased high frequency oscillations (beta and gamma) in the same regions (Thomas et al., [2014](#)).

As argued by Musholt ([2013a](#)), it is important to distinguish between having conscious experiences (“being a self”), and being aware of oneself having conscious experiences (“being aware of being a self”). While the former can be a subjective experience, the latter requires an objectification of that experience. To use Kegan's CDT terminology, being a self is considered Subject while being aware of being a self is considered Object. In other words, while it is possible to simply have a subconscious perception of something, it requires a higher level of cognitive development to bring awareness to oneself having that particular perception, or to make Object what was previously Subject. Returning to the previous political example, it would require a higher level of cognitive development to bring awareness to holding a particular political viewpoint, as compared to simply holding that viewpoint and being subject to it.

Studies looking at distinguishing between these two concepts are lacking, mainly because the phenomenology used in the investigation of self-related processing is often indistinct (Legrand, [2007](#); Flores-González, [2008](#); Musholt, [2013b](#)). Also, the above referenced studies require some degree of objective awareness of self in order for subjects to participate in the tasks, meaning the tasks themselves contain elements of both subjective and objective self-knowledge and assessment.

In addition, because psychological tasks that assess self-relatedness involve other cognitive processes such as reasoning and memory, it is likely that the brain structures and neural networks involved in self-related processing are common to several cognitive methods. In fact, Legrand and Ruby ([2009](#)) go so far as to propose that standard methods targeting the self are in fact non-specific, and any neural activity elicited during participation in self-evaluation tasks can be reduced simply to inferential processing and memory recall. Therefore, in order to properly assess the neural representation of self-awareness, it will be important to develop tasks that are not only specific to processing of the self, but also that attempt to distinguish between the components of Subject and Object therein. Regardless, neuroimaging research in this field has led to inferences that may prove useful in the investigation and treatment of psychiatric disorders such as depression.

Implications in depression

Rumination is a common characteristic of depressive disorders, in that patients often have an increased tendency toward self-focus, self-assessment and self-appraisal. The nature of that self-related processing, however, tends to be biased toward negative emotional processing. When mapped using neuroimaging, these thoughts localize to anterior cortical midline structures such as the cingulate gyrus (Nejad et al., [2013](#); Wagner et al., [2015](#)) and medial prefrontal cortex (Lemogne et al., [2012](#); Li et al., [2017](#)), with these areas demonstrating increased activity in patients with major depressive disorder. In addition, administration of a single dose of the antidepressant mirtazapine has been shown to attenuate this abnormal fMRI activity in these structures (Komulainen et al., [2016](#)), reinforcing their importance in this disorder.

In the field of neuromodulation, these findings have led, in part, to the development of targeted deep brain stimulation (DBS) therapy that is currently under investigation for treatment of severe major depressive disorder. Targeting the anterior cingulate cortex, specifically in the subgenual cingulate area or Brodmann area 25, has shown promising results in the treatment of patients refractory to medications (Mayberg et al., [2005](#)). While only a subset of patients respond to this treatment, further investigation into self-processing networks may shed light on DBS mechanisms in depression, further expanding therapeutic options.

Theory of mind

Self-related processing encompasses the subjective possession of mental states and the objective awareness of having those states. Theory of mind, however, goes further by encompassing not only the objective awareness of one's own mental states, but also understanding that others possess mental states that can be different from one's own. This is exceedingly important for normal social interaction, as making sense of and predicting the behaviors of other people are essential components of effective communication (Happé, [2003](#)).

Functional MRI studies have implicated the medial prefrontal cortex and temporoparietal junction as important brain regions in theory of mind. These regions are active during complex interconnected mental concepts such as the representation of another individual's actions, desires, and belief systems, the formulation and judgment of other's perspectives, and the inhibition of actions (McCleery et al., [2011](#); Gweon et al., [2012](#); Bowman et al., [2017](#)). Furthermore, the activity of these regions during theory of mind tasks correlates with age, in that ventral medial prefrontal cortex is more active in children, dorsal medial prefrontal cortex is more active in adolescence, and temporoparietal junction is more active in adults (Moriguchi et al., [2007](#); Blakemore, [2012](#); Sebastian et al., [2012](#); Vetter et al., [2014](#)), which may point to a developmental component.

Furthermore, electroencephalography (EEG) has been used to study the association between action processing and theory of mind (Marshall and Meltzoff, [2011](#); Bowman et al., [2017](#)). Event-related decreases in amplitude of alpha rhythm (8–13 Hz) during voluntary actions, termed mu desynchronization, have been shown to correlate with the degree of action production and internal representation of that action. Bowman et al. ([2017](#)) has shown that when mu desynchronization was high, a positive correlation was present between action production (i.e., voluntary hand movement), action perception (relationship to the experience or proficiency in action production), and theory of mind (social reasoning), indicating an integrated underlying neural network. Conversely, when mu desynchronization was low, there was a negative correlation between the action and the internal

representation, which may be explained by the absence of neural integration for those specific actions. Therefore, the relationship between the neurophysiologic changes during these actions and theory of mind, as measured using scalp EEG, appears to span neural networks.

It is important to determine whether the neural networks and cognitive mechanisms that are used to attribute thoughts and feelings to others are the same as those used to attribute mental states to the self (Happé, [2003](#)). In order for a particular thought or feeling to be attributed to oneself or to another, it must first be recognized *as* a thought or feeling, which means it must be brought from Subject to Object. As expected, this would involve the same neural mechanisms as those in self-related processing, namely the CMS. The mechanisms involved in making Object another person's thoughts or feelings, however, may lie in mirror systems, where certain regions of the brain become active when observing or mimicking the actions of another individual. These regions, which include the inferior frontal gyrus and inferior parietal lobule (Iacoboni and Dapretto, [2006](#)), have been shown in both primates and humans to become active when observing the mental states of others (Gallese, [2007](#)), potentially by enabling direct mapping of another's goals and intentions to the self (Mahy et al., [2014](#)). The understanding of these processes may prove useful in the investigation of diseases such as autism, where individuals have difficulty in understanding and predicting the mental states of others.

Implications in autism

Autism is a spectrum disorder characterized largely by deficiencies in social interaction and impaired development of theory of mind. A large fMRI study comparing over 400 subjects with autism to normal controls has shown that there is reduced connectivity between brain regions implicated in theory of mind in autistic people (Cheng et al., [2015](#)). Specifically, there was reduced connectivity between areas of facial-expression processing, namely the middle temporal gyrus and ventromedial prefrontal cortex, and spatial functions relating self to the environment, namely the precuneus and superior parietal lobule. Also, neurophysiologic correlates have been described relating repetitive behaviors to changes in alpha-band (8–12 Hz) desynchronization (Keehn et al., [2017](#)), and subsequently attempts have been made to correlate these physiologic changes to differences in information processing, cognition, and behavior (Belmonte, [2017](#)). In addition, transcranial direct current stimulation of left dorsolateral prefrontal cortex (Amatachaya et al., [2014](#), [2015](#); D'urso et al., [2015](#)) and right posterior parietal cortex (English et al., [2017](#)) led to improvements in clinical autism severity scales measuring functioning, hyperactivity, and noncompliance. This supports the theory that there is a potentially reversible dysfunction in the mechanism involved in understanding and computing mental states, although it is unclear whether this dysfunction causes autistic symptoms, manifests as a result of autistic behavior, or both.

One of the reasons individuals with autism have difficulty understanding their own mental states and those of others may be that they have difficulty objectifying their emotions and ideas. In other words, they “lack the cognitive machinery to represent their thoughts and feelings *as* thoughts and feelings.” (Happé, [2003](#)) Or, to use terminology from Kegan's CDT, they lack the cognitive machinery to move their thoughts and feelings from Subject to Object. Therefore, investigation into the neural mechanisms underlying these processes may prove useful in developing and honing novel neuromodulatory approaches in the research and treatment of this disorder. As we shall see, computer modeling may aid this investigation by bridging the gap between psychological observations and neural processes.

Computational models of cognitive development

The observation that behavior can traverse apparently discontinuous stages during development raises the interesting question what kind of changes in the neural processing substrate are responsible for this phenomenon. Computational modeling has been a valuable tool in this respect when studying child development, as it allows simulating the behavioral consequences of particular modifications of the neural processing “hardware.” It can therefore help bridge the gap between psychological observations and the underlying neuroscience.

Early computational models of child development were based on abstract, rule-based representations. While these models provided interesting insights, there is no straightforward mapping between these model structures and processing elements in the neural tissue. This changed to a certain degree with the advent of connectionist models. These models are based on layers of model “neurons,” which are connected to each other to allow excitatory or inhibitory influences of a neuron's activity on the activity of other neurons. While one should be cautious to think of these model “neurons” as being equivalent to individual neurons in the brain, the processing structure is similar enough to be able to make some inferences about neural processing. The results of several studies suggest that developmental stages can be best accounted for when structural change in the network model is allowed (Westermann et al., 2006; Shultz, 2012, 2015). Typically, the network starts out with a particular structure (number of neurons and arrangement in different layers) and is being trained to perform a particular task. Training means changing the strength of connections between neurons in such a way that the network's ability to perform the task is improved, which corresponds to the learning process in real life. The training progresses until the network reaches a stable, but still imperfect performance, at which point new neurons are added to the network. These neurons are then able to compensate for specific weaknesses in the network's performance. Interestingly, the network is typically not able to achieve the same performance when it is comprised of the same total number of neurons from the very beginning, in which case all neurons participate in a distributed representation of the general problem, without being able to provide the specific performance improvement that results from some neurons being added at a later point in time.

Models of development based on Dynamic Field Theory (DFT), however, have demonstrated that developmental stages can also be observed without necessarily having to change the structure of the model in the sense of adding neurons at a later time point (Schlesinger, 2012; Spencer et al., 2012). These models are based on the assumption that some global network parameter, as opposed to the learning-driven changes of the strength of individual connections that have been discussed earlier, changes during development. Examples of such a change would be an adjustment of the overall resting level of a dynamic field or an overall increase in the strength of locally excitatory interactions and laterally inhibitory interactions. Relatively small changes of such parameters can generate qualitative differences in the field dynamics and therefore account for the observation of developmental stages.

While connectionist modeling and DFT appear to be fundamentally different modeling approaches, Thomas et al. (2009) have argued that, although they emphasize different aspects of the developmental process, many key aspects of the mechanisms that give rise to developmental stages are shared between them. The authors therefore encourage constructive integration of the different approaches. Computational models' success in explaining observations of child cognitive development suggests that similar modeling approaches can link adult cognitive development to changes in neural substrate.

Conclusions and future directions

Cognition has the potential to evolve over the course of adult life. As more complex ideas arise and varied perceptions come to light, newly discovered concepts present novel ways of approaching conflict and making meaning of everyday interactions. This is possible by bringing awareness to mental constructs that were previously in the subconscious, or making Object that which was previously Subject.

Kegan's CDT provides a solid framework within which to explore these ideas. While it is not the only psychological theory of adult cognitive development, its constructs are logical, its concepts are widely applicable, and it has been validated in business and educational settings. Therefore, it serves as a useful model within which to develop and test various hypotheses. However, its basis in psychology makes it difficult to extrapolate those ideas to neuroscientific applications, and as such we must build upon related concepts in an effort to make the leap from the social sciences to the sciences.

Useful related concepts include self-related processing, mindfulness, and theory of mind. While we have explored some of the fMRI and scalp electroencephalographic characteristics of these concepts, invasive human neural recording studies were not discussed because they are distinctly lacking in the literature. Obtaining invasive human neural data is, naturally, invasive, so we propose that human neural recording and stimulation experiments be conducted in individuals undergoing neurosurgical procedures for other purposes. These procedures include intracranial electrodes implanted for the evaluation of epilepsy, deep brain stimulation electrodes implanted for the treatment of movement and psychiatric disorders, and cortical electrodes used during awake brain surgery to aid in the resection of tumors and seizure foci. For example, epilepsy patients with implanted intracranial electrodes for the evaluation of seizures can perform theory of mind or mindfulness tasks while in the hospital. This poses no additional risk to the patient, while providing valuable information in the form of human local field potentials, single unit recordings, and the effects of micro and macro stimulation on task performance.

While cognitive neuroscientific concepts such as memory are increasingly being studied in this fashion, there is an explicit lack of such experiments in social cognitive neuroscience. This lack of human intracranial neurophysiologic data is a significant hindrance to the development of neuromodulatory applications and neuroprosthetic devices that may ultimately interface with neural mechanisms underlying these cognitive developmental processes. We hypothesize that an increase in these types of studies will lead to the creation of novel applications for currently approved devices, such as deep brain stimulation and responsive neurostimulation.

This hypothesis is based on a similar example, that of the historical study of emotions using human intracranial electrophysiology. Through the use of intracranial recordings in the form of local field potentials or single unit recordings, and the use of macrostimulation to mimic particular feelings, several studies have attempted to map various emotions to specific brain regions and networks (for detailed review see Guillory and Bujarski, [2014](#)). These studies have, in part, laid the foundation for the creation of affective computing, a branch of computer science dealing with the study of human emotion and its application to wearable computer devices and robotic technology (Picard, [1997](#); el Kaliouby et al., [2006](#)). Social communicative prostheses are showing promise in helping autistic individuals understand the complex nuances of human emotion, and subsequently improve communication and social interaction. In a related manner, we have shown how computational modeling can provide insights into discrete cognitive developmental stages, and how these insights could ultimately aid persons suffering from developmental, psychological, or psychiatric disorders.

Intracranial studies carry certain inherent limitations, such as the use of patients with underlying brain pathologies, a physical restriction in recording sites, and the unpredictable effects of stimulation (David et al., [2010](#)). However, the information obtained from electrodes implanted in the brains of awake humans performing psychological tasks is unmatched in spatial and temporal accuracy, and therefore serves as a powerful tool in understanding social cognitive processes. For example, we have seen with fMRI studies that the temporal-parietal junction has implications in theory of mind. Understanding the electrophysiology of this region during theory of mind tasks, as well as aberrations during pathologic states, may allow for the development of an implantable neuroprosthesis that records local field potentials and delivers a stimulation pulse in response to abnormal recordings. These responsive neurostimulation devices are already approved by the FDA for the treatment of epilepsy (Morrell and RNS System in Epilepsy Study Group, [2011](#)), and therefore this technology could be applied to cognitive disorders such as autism once a greater understanding of the neurophysiology is obtained.

As deficiencies in adult cognitive development have been linked to disorders such as autism and depression, we have seen that bridging the gaps between developmental psychology, neuroscience, and modeling has potential implications for clinical practice. Therefore, as neuromodulation techniques such as deep brain and transcranial stimulation continue to advance, interfacing with these systems may lead to the emergence of novel investigational methods and therapeutic strategies in adults suffering from developmental disorders.

Author contributions

FG and JD conceptualized the idea; FG, DL, AG, and JD prepared the manuscript and performed edits.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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