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Chaos Theory of Careers: Standing Out Not Fitting In

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Abstract: The history of the chaos theory of careers is presented in the context of a critique of many extant practices that have dominated the field. The practice of matching models and attendant psychometric interests testing is critically evaluated, and the premises underlying such approaches are explored and questioned. The importance of narratives and stories is explored and considered in terms of complementarity rather than competition with other approaches. It is argued that the field of career development, as a whole, still has a long way to go in terms of fully appreciating the inherent nature of change, complexity, and attendant uncertainty. It is argued that this is essential if the field is to develop appropriate methods of counselling and education that take into account these realities, and that so doing has significant implications for current and future practice, methods, and tools. The paper concludes with a practical example of how the chaos theory of careers can be employed in innovative and effective career education.

The chaos theory of careers (CTC) (e.g. Bright & Pryor, 2005; Pryor & Bright, 2003a, 2003b, 2011) has been in existence for approximately two decades. The theory was originally developed reflecting the authors' dissatisfaction with extant theories at the time. In particular, the authors were not convinced that contemporary theories at the turn of the millennia were sufficient to capture some of the critical aspects of careers as experienced by individuals as observed in our roles as both practitioners and researchers. It was apparent to us that career development theory handled the concept of change very poorly. This is ironic given that career practitioners are, if nothing else, in the business of assisting people with change and transition.

Despite the rather obvious point that career development practice has always had a major focus on change and transition, the most dominant paradigm for almost all of its history has been one of understanding individuals in terms of stable traits and matching them with unvarying aspects of occupations: Holland's typography (Holland, 1957, 1973) and the theory of work adjustment (Dawis & Lofquist, 1978) being widely leading examples.

The Long "Winter of our Discontent"

The emphasis placed upon the stability of individual traits combined with the assumption that the world was largely stable and predictable was highly appealing and continues to be so. Stability offers many attractive rewards. A stable environment requires less effort to navigate and less problem solving to understand the terrain. Similarly, unchanging people require less imagination to interact with or to manage, and there is less guess-work required to meet their needs. You know where you are in a stable environment populated by stable unchanging people. Counselling can be reduced in such circumstances to cases simply fitting pegs into holes and, if they do not quite fit, banging either or both the peg or/and the hole till they do.

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However, it is far from clear that individuals are as stable and unchanging as is assumed, and furthermore the environments in which people find themselves do not appear to be anything like as stable as that envisaged by white middle class North American researchers in the 1950s. If anything, unpredicted events such as SARS and more recently COVID-19 are potent reminders of the lurking uncertainty that can wreak profound and unexpected forms of change in our lives. We note Belser and Preseed (2021), in response to deleterious impacts of the pandemic, as an attempt to provide practical systems-based implications for career counselling, incorporated dimensions of CTC counselling strategies into their bioecological model.

Furthermore, both of the originating authors of the CTC worked in the medico-legal realm and were hearing stories on a weekly basis of people whose lives had been disrupted, sometimes profoundly, by unexpected events in the form of work-related accidents. Not only were these accidents not planned or predicted, but very often the consequences of these accidents, the individuals' reactions and those of people around them, were also unpredictable and complex in their nature and consequences.

Another neglected aspect of career development theory in the 20th century had been the range and complexity of potential influences on individuals' career development. The partial exception to this was Super's life-span life-space theory (Super, 1957, 1980) which outlined a person's career stages roles but failed to provide any dynamic account for developmental transitions across these stages and roles. Moreover, the transitions themselves described white, middle class, corporate males but were less appropriate for many women, black people, First Nations people, seasonal workers, and others.

Light on the Horizon

The innovative application of systems theory to career development by our Australian colleagues Drs. Wendy Patton and Mary McMahon (Patton & McMahon, 1999) enabled a more comprehensive account of the range of influences on an individual's career development to be given. It also enabled the incorporation of a largely neglected range of sociological literature to be incorporated into career development thereby broadening the focus of the field. These contributions along with our own research (Bright et al., 2005) conducted as part of our dissatisfaction with the state of career development theory and practice at the time, provided the ideas and data which led to the authors' application of chaos theory to career development which we considered was a systems theory able to incorporate complexity, chance, and change.

However, we recognize that we must be careful in judging previous theoretical contributions from contemporary standpoints where advances in science and philosophy have occurred which were not dominant or necessarily existent at the time of earlier theorizing. Theories generally tend to reflect the age in which they were developed and the dominant theoretical ideas that abounded. In the case of career development, like so many other areas, the theories of the age were predominantly based on reductionist science. In essence, this means striving to simplify problems into what are deemed to be essential building blocks as a way of understanding behaviour. This is reflected in concepts such as vocational interest types or taxonomies, personality types, and stages of intellectual or career development.

Critiques of stage-based theories of development are not limited to career development. In the child development literature, some of the pioneering ideas of Jean Piaget (1936) relating to intellectual stages of development have been roundly criticized and found to be empirically lacking due to the over simplification. Indeed, a dynamical systems theory model of intellectual development has been proposed as a better explanation (e.g.

Spencer et al., 2006). Similarly, ideas related to simplistic notions of career development stages have also been subject to increasing critical commentary such as that presented above.

Trait and stage theory approaches to career development and choice quite correctly and reasonably drew attention to similarities in individual and group behaviors over time. A fundamental problem with such approaches however is that they tended to slip into "closed system thinking" (Pryor & Bright, 2011) characterized by an over-emphasis and over-dependence on rationality, simplicity, linearity, belief in individual control, and predictability. In counselling practice this often led to truisms: the best single predictor of future behaviour is past behaviour and the best single predictor of interests is gender. These often became frustrations for individuals on the one hand or reinforcements of stereotypes and the status quo for groups on the other.

The continuing popularity of the matching paradigm is as much a function of its availability and convenience as it is of its utility and validity. Such an approach fits perfectly with computer technology since all computers are fundamentally data matching machines. Numerous inventories and occupational information databases are available and so for resource-limited careers counsellors in many contexts, matching client skills and traits with occupations' demands and rewards, continues to be the most effective way to provide their services. While it is easy to appreciate such practical constraints, we seek to point out the fundamental limitations of theoretical foundations of reductionist approaches, the limitations of all forms of psychometric predictability, and the potential loss of counselling opportunities of strictly matching paradigms ultimately present in the face of an increasingly complex and uncertain world of work.

Occam's razor which served us so well for about four hundred years from the Renaissance in scientific theory, research, and practice, we are now finding has simply cut off too much. Whatever the virtues of simplifying reality in order to conceptualize it, investigate it, and apply it, we are now finding to be increasingly insufficient with quantum theory being the starkest example. Peat (2002), a chaos theory writer, characterized twentieth century science as the shift from certainty to uncertainty. Ormerod (2005) observed that it is failure rather than success that is characteristic of most biological history and human endeavour. As these and others note the issue is that reality does not come in discrete chunks – it is a virtually infinitely complex interconnected whole or gestalt which, in essence, defies all human attempts at complete comprehension, predictability, or control. For many experimentally-minded and laboratory-based scientists this has been an extremely hard pill to swallow as exemplified in Einstein's persistent, almost maniacal, opposition to quantum mechanics. One of the sources of chaos theory itself was a meteorologist trying and failing to predict the weather using mathematical models on an early computer (Lorenz, 1993). As a consequence, we have argued for the last two decades, and continue to argue, that we need to start taking complexity seriously and to fully understand the implications that it has for our approaches to career development theory and practice and for also career education.

Chaos and Order: You Can't Have One Without the Other

To understand the full impact of this it is necessary to understand the foundational concepts in the chaos theory of careers. Readers are directed to Pryor and Bright (2011) for the most expansive treatment of the chaos theory of careers to date. Other useful summaries can be found in Pryor and Bright (2019) and Bright and Pryor (2005, 2019). Arthur and McMahon (2019) provide a useful synthesis of contemporary career development theory and observe "there is increasing recognition that

external forces are often the drivers of opportunities and barriers; the best of plans may be interrupted or derailed through chance, luck and people's willingness to embrace risk and unforeseen opportunities." We argue that such career experiences are best captured within a systems approach.

It is interesting that the chaos theory of careers and the systems theory framework were also complemented in the work of Blustein (2006) in his "Psychology of Working" critique of the extant approach to career development. In particular, Blustein usefully emphasized and reminded the field of the central importance and historical roots of our field in social justice. Blustein couched the psychology of working in a systems framework, arguing that the psychology of working "challenged existing systems that had privileged some communities and marginalized others. The inclusive intellectual perspective encompassed a movement inspired by the need to expand the impact of our work to include the full gamut of relevant social sciences and an equally broad scope of epistemologies and methods" (Blustein et al., 2019). From the chaos theory of careers perspective, some of these are critical aspects that need to be taken into account in a theory.

We, and others, argue that we operate as, and within, complex dynamical open systems. This, therefore, means we and our environments are subject to continual, unpredictable, non-linear change. At times under certain conditions, local order emerges as a characteristic of self-organizing systems, however the nature of this emergence, and what it in turn may lead to, are uncertain and unpredictable. It is as inappropriate to try to eliminate "chaos" as it is to believe that unchanging order is attainable. We need to appreciate that there is a continual interplay between chaos and order and these are not opposites, but two inevitable aspects of complex dynamical systems. You can't have one without the other.

The CTC Theoretical Framework

The chaos theory of careers (e.g. Bright & Pryor, 2005; Pryor & Bright, 2007a) characterizes reality in terms of complex dynamical systems. The world can be understood in terms of complexity interconnection and susceptibility to change. There are several key aspects of the theory implied by this:

Complex and chaotic systems can demonstrate sensitivity to initial conditions or non-linearity. This means that systems can respond disproportionately to very small changes and conversely sometimes can display exceptional resilience in the face of what appear to be major external forces. There is a paradox between vulnerability, strength, and resilience.

These systems are open and therefore potentially susceptible to influence by such a huge possible range and number of factors that their casual pathways become virtually unforeseeable and usually unpredictable.

Non-linearity also poses significant problems for people relying on tools based on linear measures of behaviour. Furthermore, popular notions such as past behaviour predict future behaviour while to some extent true also suffer from the similar problem that while this may well be the case it still does not constitute a particularly strong or helpful predictor and certainly not in all circumstances.

People can and do have the capacity to surprise and to be surprised. The dynamical aspect of the complex systems is that they are continually subject to change and changing themselves. The systems are embedded within other complex dynamical systems and also within systems such as work, educational, and political systems (e.g. Patton & McMahon, 2017).

A final aspect of the chaos theory of careers that is relevant for consideration here is the tendency of these systems to self-organize into emergent patterns known as fractal patterns (Pryor & Bright, 2019). Fractal patterns can be thought of as a visual representation of the

activity of a chaotic or complex system. They exhibit a quality of self-similarity that the patterns repeat but never precisely repeat previous patterns. This is sort of like if you consider the way a tree grows, the branches emerge and then the leaves grow on the branches. There is a self-similarity about this, indeed there is a self-similarity between ourselves now and our younger selves. We are self-similar but we are not identical. These emergent patterns provide a degree of dynamic order. Consequently, the chaos theory of careers can be thought of as a theory of dynamic order. This is an important point because frequently the chaos theory of careers is conflated with Krumboltz's happenstance learning theory (e.g. Krumboltz 2009). This is based on a superficial similarity between the emphasis on chance events which, in this author's opinion, was Krumboltz's greatest contribution to the field. However, the chaos theory of careers, it is argued, provides a much fuller account of career behaviour than simply describing it as a series of unplanned events.

What should be clear by now is that adopting a chaos theory of careers approach to practice is not simply a case of cherry-picking selective concepts and attempting to incorporate them within pre-existing traditional frameworks. It is argued that we need to resist the reductionist urge to try to incorporate new information within existing structures when that new information is directly challenging those structures themselves. Admittedly, it is sometimes difficult for those approaching the theory for the first time to get beyond the word "chaos." The authors originally considered a variety of alternative terms to use, but in the end wanted to reflect the intellectual pedigree of the ideas and never to be seen to claim that chaos theory was their invention – far from it. The term itself is frequently criticized as poorly chosen as it is as noted above, it is a theory of dynamic order and not a theory suggesting that everything is completely out of control.

Thus, it is argued that the chaos theory of careers should be seen as standing out rather than fitting in. Despite this, it is too commonly the case that while there are protestations that complexity and inherent uncertainty is fully appreciated, subsequent practice then blithely continues as though the future is controllable and predictable. Hence, we continue to see the somewhat over-zealous application of career plans and transition plans, particularly in career education for young people. It is also commonplace throughout organizations in terms of performance planning and goal setting. At the time of writing, this is evident in the quite natural hopes for the end of the COVID-19 pandemic and also the catastrophic approaches that have essentially ignored the problem under the rhetoric of "opening up" and "living with Covid." This has resulted in several countries exhibiting patterns of opening up only to close down again and reimpose public health measures such as mask wearing or lockdowns.

The complexity theorist David Snowden (e.g. Snowden & Boon, 2007) has developed a very useful framework for considering the complex nature of problems and associated methods that may be used to explore different problem spaces. The quadrant model has undergone many revisions since it was originally proposed in 1999 but at the time of writing consists of four quadrants of problems labelled obvious, complicated, complex, and chaotic. This quadrant is helpful in considering some of the reactions to the chaos theory of careers and also helps to explain some of the continuing practices based on assumptions of predictability and simplicity.

The obvious quadrant is the simplest, this is reflecting a very stable and orderly system where there are very clear relationships between cause and effect. It is the idealized situation where there is a high degree of predictability and it is possible to understand how the system operates.

The second quadrant is the complicated domain. In this domain understanding how the

system operates very often requires more extensive analysis or expertise. Typically, there is no single right answer possible and there is a range that needs to be considered. In such domains more highly skilled judgement and expertise are required.

The third domain is termed complex and this is, as the name implies, where cause and effect are not clear and will reveal themselves in retrospect – in other words they emerge. This domain does not yield to breaking it down into simple parts which are well understood, in other words reductionism does not work in this area. In fact, intervention can change the operating dynamics in unpredictable ways.

The final domain in the framework is called chaotic. In this situation cause and effect are unclear. Here the term chaos is being used in its more commonly understood term to mean a complete lack of order and therefore differs slightly in our usage.

Powerfully, the framework provides practice guidelines as to what to do in each situation. In the obvious domain the advice is to sense-categorize-respond. In other words, establish the facts and then respond by following rules or applying best practice. In the complicated domain the approach is to sense-analyze-respond i.e., assess the facts, analyze and apply appropriate good operating practice. Whereas in the complex domain the process advised is probe-sense-respond. This is where conducting experiments can be helpful in discovering aspects of the system operation and may help people move to the next step. However, it is very much a step-by-step process. Finally in the chaotic domain the advice is to act-sense-respond. In other words, the immediate priority is to establish a sense of order and try to identify where there is some stability.

This framework highlights what the chaos theory of careers has essentially been noting from its beginning. That the much vaunted reductionist claim to the virtue of simplicity as exemplified in the trait theory and matching practice is fundamentally inadequate for a world presenting us with the challenges in the complex and, at times, chaotic quadrants. From the chaotic from the chaos theory of careers it is argued that career development is more sensibly thought of at the very least in terms of the complicated domain and far more commonly in terms of the complex domain. Sadly, occasionally it is also characterized by the chaotic domain.

The CTC in Counselling Practice

Consequently, the practice implications of the CTC framework include, encouraging people and teaching people how to make sense of their situation by undertaking, for instance, probes and conducting experiments to understand the circumstances that they find themselves in. This emphasizes iterative processes such as experimentation and then evaluation and then undertaking further experimentation, and repeat. This has been set out by Pryor and Bright (2016) “clients are encouraged to think emergently initially in order to open up possibilities, generate options, explore situations, ask new questions and consider taking risks” (p. 198) and “the outcomes of the Chaos based approach are deliberately less certain and messier” (p. 206). They reflect and assume ongoing change, and that the change may be unpredictable. To this end they emphasize the process of continual exploration, self-exploration, discovery, learning, and feedback as ways of constructing a career in that decisions may have to be taken under conditions of uncertainty and unless we are prepared to embrace that uncertainty, the result may be further hesitation, prevarication, and closed system thinking that results in drifting, aimlessness, or a feeling of being stuck. Further, they go on to say “rather career construction involves the repeated decisions, actions, feedback, learning and further actions. In this we can construct and transform our careers in dynamic adaptation and development.”

Despite these exhortations, it is apparent that we have a tendency in many domains in life, for

instance the reaction to COVID, for us to fall off the "complacency cliff" having assumed we were living in a comfortably obvious world and then find ourselves in the realms of chaos. There is a better way and the quadrant identifies complexity and methods that can be used and also complicated systems as ways of managing our situation. We are likely to end up in chaos if we fail to appreciate this and the same goes for theoretical approaches.

The "Problem" of Career Decision Making

These biases in our thinking are reflected in the approaches to what is seen as the "problem" of career decision making. Very typically we have stuck to the reductionist or "keep it simple stupid" approaches to career development. This, in part, may be exacerbated by the patchy minimum training and standards required for entry into the field historically, although recently this has been addressed around the world which is a welcome development but more needs to be done.

Career decision making is not a simple or obvious problem but far more commonly it is at the very least complicated but we would argue usually is a complex issue. Consequently, trying to "solve" the problem of career decision making by characterizing it as an infrequent or one-off event that can be addressed with a static "plan" is misguided and fundamentally so. Careers, opportunities, and the world of work and labour markets simply do not stop while people are making decisions only to restart and to continue in time-honoured and predictable fashions. To characterize the environment in which we have to make decisions in such terms is at best fanciful and at worst is failing to prepare our clients for reality.

It is interesting to consider the idea of knowing oneself which is a popular starting point in relation to career development. A moment's reflection will suggest that there is an implication that the self is relatively unchanging and trait like and so is easily discoverable. Quite like how such a notion equates to the injunctions to life-long learning is not immediately apparent. It seems that if we should encourage people to a life of continual learning, that presumably also extends to learning about one's own capacities, dispositions, and interests all of which are likely to be in a state of change, sometimes rapidly, so and will not necessarily yield to simplistic investigation.

Consequently, gathering knowledge both of oneself and the world of work is likely to be an ongoing dynamic process of repeated experimentation, evaluation, further experimentation, and probing both oneself and the world as it changes and one changes in it and the relationships between the world and the individual change.

Clearly, we do need to make decisions and to take actions and consequently the focus should be on sensing our situation as best we can while fully appreciating the inherent uncertainty in it and determining what the next steps may be. In doing so we must recognize that it is not the case that the path will be clearly set out in advance; the path is created by the steps that we take and will change as a result of taking those steps. This is not always immediately evident in practice.

The professional context for many career development practitioners is working in either high schools or higher education settings. In such relatively artificial settings, pathways do appear to be at least superficially set out and clear. It is certainly the case that if you are following a professional program to become an engineer, psychologist, nurse, doctor, or are engaged in an apprenticeship there are very clear paths and hurdles that one has to follow and overcome in order to reach a goal state of becoming a certified tradesperson or to become a licensed professional. Similarly, even in non-vocationally orientated programs there are rules and regulations about what subjects can be taken and what is required that constitutes passing or graduation. This sets up the illusion that, in life generally, there are relatively rigid and clear pathways which are logical.

However, outside of these artificial constraints it is not the case that there are necessarily obvious and good answers which are readily discoverable when making a decision. Consequently, ways of interacting with the world where we can experiment and use playfulness as a way of exploring in much the same way that young children use play strategically to understand their environment and the relationship between objects in it, is potentially a very useful way of moving forward. Elsewhere (Pryor & Bright, 2009) we have suggested game theory and play as a potential practice model and, with the widespread use of online gaming, this may now present a useful analogical model in counselling for career decision making if appropriately applied. Note if the career decision is seen as a process rather than a one-off event encouraging playfulness does not come with the attendant characterization of it being somehow reckless. As Snowden (2022) states "one of the key messages of how we manage complexity is that we need to start journeys with a sense of direction which includes seeking out the adjacent possibles, selecting the most coherent and then making a move (or moves in parallel) and look again."

The Overuse of Testing and Single Narratives

Typically, this has been reflected in career development in the overuse and central position of psychometric tests in particular vocational interest tests. Developments using narrative are to be welcomed and to add a degree of complexity. However, it can, if not handled carefully, represent another form of reductionism where it is mistakenly assumed that the narrative that is captured is somehow the person's "story" singular rather than attempting to encourage diversity of thinking by generating multiple narratives. Holding those narratives simultaneously even when they are contradictory may be better than an attempt at aggregation or a synthesis into one overarching story. It should be apparent when considering famous celebrities who are subject to multiple biographies that each one, possibly due to concerns of being unique and with an eye on sales, will tell different stories and emphasize different facts in the famous person's life.

Consequently, from a chaos theory of careers perspective the emphasis must always be on trying to inject the dynamic and complex into career education and also into career decision making support. That is, to encourage people at all times to appreciate the dynamic, complex, changing, and uncertain nature of both themselves and the environment in which they find themselves which necessarily places constraints on long-term predictive planning and hopefully encourages people to engage in a more step-by-step approach as well as placing emphasis on developing strategies to be able to redouble efforts or to back track and explore different directions or to explore different directions simultaneously. Furthermore, we want to encourage people to undertake these tasks on a more or less continual basis, though admittedly with varying degrees of intensity at different times.

The failure to learn this lesson is seen regularly with people falling into what Pryor and Bright (2007b) have termed torus attractor closed system thinking where people fall into routines and follow habitual forms of behavior treating their work or their lives, or indeed themselves, as though they are closed systems. While this provides economy in terms of effort and thought and a sense of reassurance it can be ultimately false as is seen by the loyal worker who is suddenly made redundant and realizes that they have not practiced skills of exploration, reinvention, or maintaining contemporary skill sets until it has been forced upon them and is sometimes deemed to be almost too late.

Within the constraints of reductionism in the assumptions of relative predictability the field too often in the past has engaged in ultimately sterile debates, for instance between vocational interests as championed by John Holland and

the vocational development researchers such as Donald Super. Similarly, there have been debates setting up in competition or as polar opposites psychometric testing and qualitative or narrative approaches. It should be apparent that if we are dealing with a complex uncertain world what we should be doing is not trying to narrow down and use a small range of approaches derived from the same premises, but rather to encourage diversity of thinking and process to try to understand and map out the environment and the individual using multiple and complementary approaches.

In this regard Akkermans et al. (2019) note the unpredictability of career experience and introduced the notion of "career shock" to highlight the impact, positive or negative, on a person's career of factors over which they have no control. They quite correctly acknowledge that the chaos theory of careers identified such impacts but these authors are incorrect in their assertion that the CTC fails to "explicate how this process unfolds." It appears that they reach this conclusion due to their failure to read sufficiently widely what we have published on this topic. They fail to conceptualize change in systems theory terms and therefore miss appreciating the explanatory power of concepts including non-linearity, attractors, phase shifts, fractality, and emergence, all of which address the conceptualization they believe is missing (Pryor & Bright, 2011).

Pryor and Bright (2011) introduced the counselling quadrant as a way of illustrating how divergent and sometimes superficially competing approaches in fact can be seen to be complementary and allow career practitioners to use multiple methods. In relation to an individual, you can consider the qualities of a person in terms of what we termed their convergent qualities. These are qualities that are shared across many different people and include attributes such as height, weight, or strength. They also include other easily comparable measures of human behaviour including personality as measured psychometrically, vocational interests or achievement in relation to mathematics, spelling, or a range of other assessable skills. These, as implied, lend themselves to forms of measurement. However, relying solely on these may provide some comparative data about where one stands in relation to other people but does not necessarily map out the terrain in anything like sufficient terms. In contrast there are aspects or qualities of individuals which are unique to them and are not readily comparable or indeed captured using linear psychometric tools. For instance, personal experience, the person's life history, and anecdotes. The personal experience of that person, the person's reactions will vary from person to person and sometimes in ways which are profound in terms of their ongoing adjustment.

Consequently, attending to an individual story is critically important as is recording multiple different stories to assist in understanding a circumstance. Further, it is not necessarily the case that one should rely on the story told by the individual. Although this is likely to be the most personally meaningful, anyone who has been to reunions of family or friends will readily recognize that stories will be told about an individual, some of which they will deny, find surprising, or be previously unaware. All of these can add to the richness of the understanding of terrain with which we are dealing. Pryor and Bright (2011) termed these the emergent qualities of an individual, this uniqueness that emerges into the fractal pattern of the individual can only be attributed and relate to them and to no other person. Consequently, if we are going to do proper career counselling which is personal (e.g. Savickas, 1997) then we do need to be able to capture such narratives.

It should be obvious therefore that although there is potentially a role for formal measurement, it is limited in its ambit and should not form the central plank of either career education or career counselling. However, equally it is the case that narrative on its own is

not sufficient. Lurking behind all of this is the possibility for change and the need for constant probing, experimenting, and checking.

What is argued for here is a need to revisit and fully appreciate the dynamic nature and the complex nature of career decision making and career development. We would argue that this needs to be reflected in the training of career practitioners in practice and also in career education and related policy. The remainder of this paper will set out a practice example that two of the authors are personally involved and invested in which is an attempt to provide an innovative approach to career development for Year 5 and above students based on the tenants of the chaos theory of careers as set out above.

Pryor and Bright (2017) provide a comprehensive outline of the practical process of chaos theory based counselling with a variety of suggested strategies, tools, and exercises. Bright and Pryor (2013) addressed the application of chaos theory to the issues associated with organizational transformation and change in response to a complex and changing world. We have also analyzed the limitations of goal setting as a strategy in both counselling and consulting from a chaos theory perspective (Bright & Pryor, 2013). This paper is concluded with an example from the career education context illustrating how some of the key premises of the chaos theory of careers can assist individual engage constructively with the realities of the world they will continue to encounter.

An Application of the CTC in Career Education

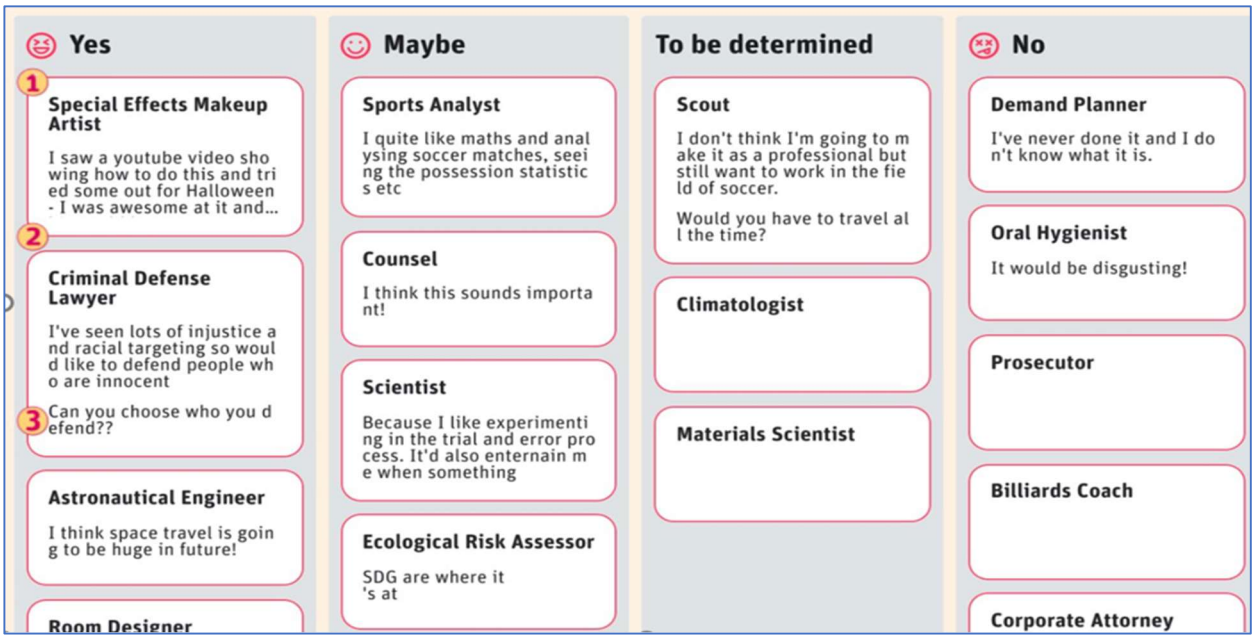
The BECOME career education program that was designed to provide an innovative and interactive career education program for schools starting at year 5 (age 10) and up. Most educationalists agree that we need to provide young people with the time to think deeply and explore broadly, to practice expressing and developing career ideas. If students' ideas about their future are prematurely narrowed or distorted, and remain unchallenged, their decisions for schooling and for their future may be based on unsteady, unproven foundations. Despite what seems to us to be a rather self-evident statement, career education generally does not commence in any systematic fashion until the later high school years. Then it too frequently is characterized by a preoccupation with narrowing down each student to a singular career school-to-work transition plan.

The BECOME philosophy is of an inquiry-based approach to career education. We argue that this provides young people with the opportunity to develop a better understanding of who they are and how they can actively design their future in a constantly changing world of work. We cannot teach young people how to think critically and deeply about their future in a rush when major decisions need to be made. Instead, we need to give them the time, tools and strategies to learn and practice the skills they need to explore, design, and navigate their future.

For careers education to be effective, we need to take this approach early, do it often, and integrate it across students' learning. The BECOME program provides careers education from upper primary onwards, in which students learn adaptive chaos-informed skills, the skills they will need to design and drive their future direction. BECOME provides students with personalized guidance and dynamic information in a way that explicitly deepens their understanding of themselves while at the same time broadening their awareness of the world of work and the many ways (and many whys) people engage with work.

BECOME is a teacher-led program with three sections, which we call domains: Awareness, Aspiration, and Agency. In the domain of **Awareness**, the 180 year 5 & 6 students explored the world of work through the app and activities such as "If our class ran the world." They also explored the influences operating on them, such as parents, community expectations, media, friends, and stereotypes.

Figure 1



In **Aspiration**, students conducted deep research into their ideas and refined the list of things that they liked. Their log in the app became a running hypothesis for the future (see Figure 1).

The inquiry approach comes to the fore in **Agency**. In this domain, students defined, designed, and conducted an experiment (or a kind of rapid prototyping) to test out one of their ideas and try it on for size in a way that was appropriate to their age and resources.

Examples of student inquiries (experiments) include:

Do demolition companies need to have a plan? – This student was beginning to think in a very real way about what this area of work looks like in actual practice, going beyond their initial reaction of excitement.

Do I have the patience to be an animator? – The student was interested in the field of digital animation but had learned something about themselves (that patience is sometimes a challenge). They set a personal animation challenge that required patience and gave it a try.

How sociable is a zookeeper's job? Would I get lonely only talking to animals? This student was beginning for the first time to think about the daily experience of a zookeeper rather than a vague and possibly idealized idea.

How do interior designers ensure make clients happy? This student wanted an interior designer but was working out that the client relationship was going to be really important.

Figur

It was found that 50% of those experiments result in a change of plan. Changing a plan is good, because it means each student is taking charge and learning about themself. The BECOME program has given them time to test and refine their ideas rather than blindly committing themselves, their time, and money to a pathway they have not really considered.

Results indicated that 99% of students said they had learnt more about careers from the BECOME program. Pre-program students aspired to a narrow and traditional set of careers, 52% of the cohort aspiring to just five occupations: Physicians & Surgeons, Visual

Arts, Athletes & Competitors, Performing Arts, and Veterinarians & Assistants. This is even more concentrated than The Organization for Economic Cooperation and Development reported Program for International Student Assessment (PISA) data discovered. By the completion of the program, 60% of the cohort discovered new career possibilities, but importantly, new options they considered relevant and interesting career alternatives.

The BECOME program is a fully expressed application of the chaos theory of careers. The emphasis on experimentation and broadening as opposed to narrowing down is consistent with the chaos philosophy. Importantly, the BECOME program has empirical support as a career education intervention, and adds to the body of evidence pointing to the efficacy and practical utility of chaos-based interventions when designed with imagination and care.

Final Comment

If anyone anyway ever needed convincing that we live in a complex, interconnected, lightning fast changing, and unpredictable world, surely COVID-19 and its ongoing consequences must have silenced all their doubts. If ever we have seen the chaos theory talisman impact of the butterfly effect surely COVID is it: an initial small disturbance in a complex connected system causing nonlinear change with the transformation of the system with new emergent structures. This is what it is to live on the edge of chaos and all of us do, despite our illusions to the contrary, all of the time. It may not be as earth-shattering for us individually as an individual may manifest itself in pandemic implications. However, the inexorable interplay of stability and change, control and chance, knowledge and uncertainty remains to form the parameters of our lives and our careers. Assisting individuals to develop this appreciation and the adaptive and resilience-based strategies to live and work purposefully and productively in light of it has been, and remains, the primary reason why we sought to develop the chaos theory of careers in the first place.

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