

# Puzzles

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First, let me congratulate the soon-to-be graduates, today's award winners, and the families that support them, especially the grandparents. One of the interesting things about becoming a grandparent is the need to relearn things and brush up skills that you haven't used for a long time. My personal favorite is teaching little people how to do kiddie puzzles. You start out with a little one sitting on your knee, and you try to guide the big wooden triangle in his tiny hand into the space on the board. This is not an easy task, as your pupil seems more interested in staring into your eyes than in participating in the coordinated hand-eye movements of early cognition. Release your guiding hand and the triangle moves instinctively into the child's mouth.

Those of you who study childhood education, neurobiology, or developmental psychology appreciate that the ability of a child to complete a complex process that simultaneously involves sensory-motor and neurological systems can be predictive of future development, but for grandpa, it is just fun to watch and participate.

As the first grandkid gets older, he moves on to more complicated jigsaw puzzles. Once again, there is a role for grandpa as teacher and mentor. At the same time, the addition of a baby brother and/or a cousin can provide competition and distraction. Peer-mentoring and the need to express the "big brother gene" thus translate into additional challenges. Those of you who study peace and conflict resolution will appreciate the problems with imbalances in power here and how negotiating equitable and sustainable settlements requires an assortment of different skills.

Looking to the future, there will be the large 1000 piece puzzles that provide the maturing child even greater challenges that present the opportunities for teamwork, a need for effective communication, and the ability to make connections.

I guess my interest in puzzles is not that surprising. I have been involved in biomedical research throughout my career. In scientific research, the rules are somewhat different than those of completing children's puzzles. Before you can add new pieces to the puzzle, you have to remove a series of the previous pieces and demonstrate that you can reassemble them to yield the same picture. Often, that is not as easy as it sounds. This critical process of repeating others' work is the hallmark of peer review in the sciences. Scientific progress is slow, and over a research career, you may be able to add only a few pieces. Occasionally one of these pieces will link two substantial areas that allow a novel connection to be

made, and this in turn allows for the rapid addition of some of the intervening pieces. In science, the most rapid advances are made at the intersection of traditional disciplines facilitated by an inspired or serendipitous connection. This often involves the application of new technologies to address old scientific questions.

If you are lucky, you will see the results of decades of work by you and your students summarized as a terse sentence, maybe even a paragraph, or ideally as a figure in a textbook. The most rewarding part, however, is to watch the students you have guided continue to evolve into successful independent scientists mentoring their own students. Maybe that is just the father and grandfather in me.

Before you dismiss the intellectual stimulus and fun of puzzles as being the exclusive purview of a few mad scientists, consider your Juniata degree. To complete this puzzle you assembled at least 120 credits of which a defined number are needed to meet those pesky FISHN and skills requirements. The pieces are three dimensional and the resulting graded contours of your assembled puzzle help to identify your strengths and weaknesses. The peaks identify your intellectual passions, while the valleys represent areas of less comfort or interest. The composite image also tells a story. If the pieces seamlessly integrate into a clear portrait, then it probably indicates that you have attained the goal of a liberal arts education. If parts of your degree puzzle seem isolated and connected by only a tenuous thread, then there is work still left to do. Fear not, for even though the graduation curtain will drop in a few weeks, there is no bar to revisiting the puzzle and adding more pieces at a later time to help integrate those outliers.

So, having successfully completed your degree puzzle, are you ready for the next challenge -- the really big puzzle of life?

The philosophers and religion POEs may approach this question by reflecting on the dichotomy of predestination and free will. They will follow a deliberative process without imposing any deadline. The more impatient and technology savvy students may look for an “app” to figure out what their lives hold. After all, technology provides you with access to more information than any prior generation has had. Maybe you should Google it or check with Wikipedia. While these information databases are good at documenting things that have happened, their ability to predict the future is not so hot, especially when the questions are focused on individuals who have not completed their first twenty-five years of life.

To answer this question, the biologists may be tempted to seek guidance from their genomes. The genome provides you with life’s software code, but without a comprehensive understanding of the operating system and a guarantee of a virus-free world, it provides little insight into what your life holds. Even with the high probability that by next Christmas you could each have your genome sequenced for less than a \$1,000, finding a reliable genome psychic to read your nucleotide tea leaves will still be an issue. Maybe in the next decade we will move from genome astrologers to genome predictive science or a

GPS for the double helix. However, one thing remains self-evident -- no genome “expects the Spanish Inquisition.”

The life puzzle is also dynamic, and the pieces that are not attached are constantly changing. There is no box that states the number of pieces included and no picture on the lid to let you know what pieces are likely to cluster together. If there are too many pieces, it is difficult to know what area of the puzzle should be your focus. Make sure that you pay attention to the entire puzzle since connections between different areas provide new opportunities to add pieces that seemed somehow irrelevant before the connection was made.

On occasions, the pieces that you put together late in the evening, and seemed to mesh perfectly, then clash when viewed in a different light. Often the desire to make progress results in forcing pieces together that were never completely complementary. The futility of trying to convince yourself otherwise often takes much longer than it ought. Unfortunately, removing the misaligned pieces can disrupt some of the prior scaffold, making it hard to rebuild; and in the process, some of the pieces may be lost.

Then there are pieces that cannot be ignored -- a natural disaster, an accident, a terrorist attack, Cupid’s arrow, becoming a parent, losing a parent, or a personal moment on the road to Damascus. These events necessitate taking a timeout to review of the currently assembled puzzle, the available unattached pieces, and the very purpose of the puzzle.

So, with no instant answer to your future, where do you go for insight on how your life might unfold and how your life puzzle will turn out?

In infectious disease studies over the past thirty years, we have been confronted with a variety of new human pathogens and diseases, most notably HIV/AIDS. At the time the first patients were being identified, those of us responsible for training the next generation of infectious disease health professionals had no idea what we were dealing with. There were no experts, no textbooks, and no literature to fall back on; however, the problem was real, urgent, and definitely scary. In the absence of an identified cause, the traditional principles of epidemiology kicked in, and those leading the quest for understanding of this newly described acquired immunodeficiency syndrome spent a lot of time looking at how other disease patterns were initially studied. Important in this process was the input of retired senior scientists who had previously worked through and developed a management plan for prior epidemics like polio or smallpox. These senior scientists did not have the answers, but they provided reassurance and encouragement that if you collected enough data and kept developing and testing new hypotheses, there would be a breakthrough that would allow for a logical plan to manage the emerging AIDS epidemic.

These voices of experience were of course correct, and when the HIV retrovirus was isolated and characterized, a more focused approach to diagnosis, prevention, and treatment followed. Reliable

diagnostic tests were developed; ways to protect the blood supply were implemented; and public education programs to attempt to reduce the spread of the disease were launched. The pharmaceutical industry initiated a major thrust on the design of new antiviral drugs, and immunologists sought an effective vaccine. While there is as yet neither a cure nor an effective vaccine, the puzzle has some real structure now and pieces are being slowly added all the time.

So, as you contemplate the uncharted course of your future, where do you go for sage advice and guidance that is relevant to you? If you really want to gain some insight, turn off the cell phone, take out those earphones, and if you are fortunate enough to have the opportunity, sit down and ask grandma and grandpa about doing life's complex puzzle. You will be amazed at what you will learn. Grandparents will love to have the opportunity to share their wisdom and reflect on the significant choices that have contributed to their own puzzles. You may be surprised how uncertain the future was for them when they were your age.

Good luck in completing your puzzle, and thank you for your attention.