

Too Much Information

The Role of Cognition in
Performance Stress



by James Stern

We are all aware of the emotional and physical changes we experience on stage, as well as the detrimental effects that these changes can have on control, concentration, memory, expressiveness, and enjoyment of the occasion. On the other hand, we tend not to be aware of a certain cognitive change we undergo in performance, and may mistakenly ascribe its effects to those emotional changes. As a violinist who frequently gains from the presence of an audience, I try to help my students understand what I do that is so effective for me. Three recent popular books have helped me to understand it better myself, and the slow realization that they were all converging on some important violinistic wisdom was exciting for me.

The first book, *The Curious Incident of the Dog in the Night-Time* (New York: Vintage, 2003) is a work of fiction. Its author, Mark Haddon, who used to work with autistic children, creates a character named Christopher, an autistic 15-year-old boy who narrates the story in the first person. The second, *Animals in Translation* (New York: Scribner, 2005) is written by an actual autistic person, Temple Grandin. She is a university professor who, in addition to creating innovative therapies for autistic people, has also revolutionized the handling of livestock worldwide. With the help of her co-author Catherine Johnson, she demonstrates how the affinities between animals and autistic people reveal important things about the normal human mind. A third book, *Blink* by Malcolm Gladwell (New York: Little, Brown and Co., 2005) observes how people make decisions when huge amounts of information are involved. Together, the three books point to an ironic situation: that we can often be overwhelmed by information but that we respond to this circumstance by seeking even more.

We have no choice about the first part of this situation. The violin as an instrument tends to respond to our actions by giving us an overwhelming amount of information. In addition, the repertoire we play, especially if it has a lot of notes at a fast tempo, gives us a lot to process. On top of this, the pressure of performance can alter our mental functioning so that our minds receive even more information than usual.

We do have a choice about the second part. We can cultivate information-reducing behaviors which have a triple benefit: they result in good technique; they put the performer in touch with the emotional content of the music; and they provide the thrill of putting a lot at stake in a performance while enjoying a sense of security, safety, and relief from the unwanted physical and emotional changes.

The Mind Overwhelms Us with Information: Introducing Christopher

Let's let Haddon's character Christopher have the first word. "I see everything," he begins, then goes on to explain:

... most people are lazy. They never look at everything. They do what is called glancing

... And the information in their head is really simple. For example, if they are in the countryside, it might be

1. I am standing in a field that is full of grass.
2. There are some cows in the fields.
3. It is sunny with a few clouds.
4. There are some flowers in the grass.
5. There is a village in the distance.
6. There is a fence at the edge of the field, and it has a gate in it.

... But if I am standing in a field in the countryside, I notice everything. For example, I remember standing in a field on Wednesday, June 15, 1994, and I noticed these things

1. There are 19 cows in the field, 15 are black and white and four are brown and white.
2. There is a village in the distance which has 31 visible houses and a church with a square tower and not a spire.

[he lists five more items in similar detail] ... And there are 31 more things in this list ... And it means that it is very tiring if I am in a new place because I see all these things, and if someone asked me afterward what the cows looked like, I could ask which one, and I could do a drawing of them at home and say that a particular cow had patterns on it like this ... [p. 140-2]

Persuading you that there is something in your experience analogous to Christopher's may not be an easy job. Unlike our bodies and our emotions, our cognition is a difficult thing for us to observe. Like water to the fish, it is the medium we move around in, so pervasive that we don't know it's there. However, I hope that through the course of this article, readers will experience a kind of mental flip—a realization that there is something familiar about Christopher's experience. He continues:

And when I am in a new place, because I see everything, it is like when a computer is doing too many things at the same time and the central processor unit is blocked up and there isn't any space left to think about other things. And ... sometimes when I am in a new place and there are lots of people there it is like a computer crashing and I have to close my eyes and put my hands over my ears and groan, which is like pressing CTRL + ALT + DEL and shutting down programs and turning the computer off and rebooting so that I can remember what I am doing and where I am meant to be going. [p. 143-4]

Christopher is overwhelmed by information. This is uncomfortable for him (in the first quotation he described it as tiring; in the second it is disorienting, possibly frightening) so he has a defensive strategy. Consider this list of experiences people have either backstage or onstage:

1. the sound or the feel of tone production is suddenly unfamiliar;
2. the tone sounds irregular or blemished, with a lot of texture that you don't normally notice;
3. the neck of the violin feels unfamiliar and you are no longer sure of where the notes are;
4. the violin no longer feels secure between shoulder and chin; you feel the urge to constantly adjust it while performing;
5. you become aware of clothing contacting the body and a desire to adjust it constantly;
6. you're distracted by an image of rapid motion as though, for example, someone was waving their hand in front your face while you play;
7. you have a strong desire to check things that you normally take for granted, like the position of your hand for the first note, or the tightness of your bow.

I have come to believe that these are our versions of Christopher's experience; that each of them results from suddenly noticing vastly more detail than we normally do, coming through

visual, auditory, or tactile channels. It is as though we see the world through a different brain.

There Are Three of You in There: Introducing Temple Grandin

Grandin is a real-life Christopher whose work with animals has helped her understand her own predicament:

... That's the big difference between animals and people, and also between autistic people and nonautistic people. Animals and autistic people don't see their ideas of things; they see the actual things themselves. We see the details that make up the world, while normal people blur all those details together into their general concept of the world. [p. 30-31]

This difference in experience is the reason many feedlot workers find the behavior of the animals they are tending inexplicable. They cannot understand why an animal is suddenly scared or suddenly refusing to go where it is supposed to go.

... one time I went to a plant where they had a yellow metal ladder on a wall inside a building. The cattle had to go by it when they walked through a narrow alley. Those cattle just would not walk by that ladder. They'd plant their feet on the ground and refuse to move. Finally one of the yard people figured out the problem. He painted the ladder gray, and everything was fine. [p. 19]

Grandin provides feedlot owners with a checklist of 18 "tiny details that scare animals." Her special talent is that she is able to see the world the way the animals see it.

What is it that autistic people and animals have in common that makes them see the world the same way? What does this have to do with the way normal people experience the world? Each of us really has three brains, as Grandin explains:

... each one built on top of the previous at three different times in evolutionary history. And here's the really interesting part: each one of those brains has its own kind of intelligence, its own sense of time and space, its own memory, and its own *subjectivity*. It's almost as if we have three different identities inside our heads, not just one.

... roughly speaking, the reptilian brain corresponds to that in lizards and performs basic life support functions like breathing; the paleomammalian brain corresponds to that in mammals and handles emotion; and the neomammalian brain corresponds to that in primates—especially people—and handles reason and language. [p. 54]

The neomammalian brain is also responsible for generalizing, interpreting, and associating different ideas with one another—the kinds of activities involved in writing this article for example. In doing these things it leaves you unaware of the mountains of detail that animals and autistic people notice. Although Grandin asserts that it is not in control of the other two brains, she does describe the frontal lobes (an important part of the neomammalian brain) as "the final destination for all the information that's floating around your brain," and this makes them particularly vulnerable to malfunctioning. Even if they are structurally sound, there are so many other parts of the brain that could be giving

them faulty input. Grandin lists such diverse causes as traumatic head injury, stroke, developmental disability, old age, and lack of sleep as factors that could affect the frontal lobes, either directly or indirectly. Is it possible, I wonder, that the stress of performance could be added to this list? All people, says Grandin, "are like animals, especially when their frontal lobes aren't working up to par. The animal brain is the default position for people."

Positive and Negative Stress

It is important to remember that happy circumstances can be as stressful as unhappy ones in terms of disruption of one's equilibrium. In performance, negative stress means that you have emotional issues that need to be sorted out. You really do doubt yourself; you may have a memory of perceived failure that you keep reliving; you may be overly self-critical; or you perhaps haven't thought through "what's the worst that could happen." You may be in an actual panic on stage or be truly unprepared, or you haven't recently considered that enjoying yourself might be a possibility. You have made survival your goal.

Positive stress, on the other hand, simply means that you have chosen to put a lot at stake. You have something very special to say, you are well prepared and know it, you are really looking forward to moving people, you realize that performing is inherently risky with unexpected outcomes, and you're willing to take on that risk.

I believe that the physical changes we are all familiar with, and the cognitive change I am discussing here, do not distinguish between negative and positive stress. Therefore, one should investigate the possible sources of negative stress while remaining open to the possibility that what one is experiencing is in fact positive. One can only achieve in performance what one puts at stake, and such goals as "relief from affliction" and "getting through it without mishap" (or its high-strung cousin, "perfection") are at best uninspiring and at worst self-defeating. We can choose to gain mastery over positive stress by controlling the way we receive information. The violin itself can either overwhelm us with information or, properly handled, actually act as a filter, helping us to focus and balance ourselves.

The Violin Overwhelms Us with Information.

To get an idea of the special meaning of the word "information" I am using here, try the following exercises which require a pencil and paper. Make a dot on either side of the page and label them "A" and "B." We will try different ways of getting from A to B.

Line 1: First, put the pencil tip on point A and begin moving it slowly and carefully, in as straight a line as possible in the direction of point B until you arrive there. Looking closely at this line, you can see all kinds of bumps, irregularities, and corrections. A complete description of the line would be extremely long and tedious. A mathematician would not be able to describe this line with a simple equation and would probably have to resort to a very long list of pixels or locations that the line passes through. Christopher, who notices and remembers all the details, might feel burdened looking at this line. It contains a huge amount of meaningless information, which scientists call "noise," and which contributes to our sense of it being imperfect.

Line 2: Now make another pair of points, A and B. Again set the pencil tip on point A. This time sweep your arm across the page with a sudden motion. Aim in the direction of point B

but also aim beyond it. Either the line passed through point B or missed it. This fact, a choice between two possibilities, is the smallest quantity of information one can have; mathematicians call it a “bit.” The line itself contains much less information than the first line did; it is a graceful curve, free of blemishes and irregularities. A mathematician probably could write an equation that describes it.

Together the lines depict two different choices of behavior and two different kinds of sound. The first sound is careful, directionless, and characterized by “dead weight” crushing the string, countless irregularities, and opportunities for things to go wrong. The second is pure, expressive, and capable of infinite nuance. The manner in which it was produced is analogous to the martelé stroke, a key building block of violin technique because it vitally filters out meaningless information.

The Irony of the Situation

A bowed string instrument is probably more capable than any other of giving “too much information,” the sonic equivalent of Line 1. And yet such instruments actually seem to be withholding information from us. Where are all the notes, we wonder, on that fretless fingerboard? Because of this, we tend to behave in ways that increase the amount of “noise” or meaningless information coming from our instruments. I sometimes refer to these behaviors generically as “groping,” if they are used to seek information, and “hedging” if they are used to intentionally reduce clarity, thereby avoiding commitment to something that might be wrong:

1. shifting to a note early to make sure it is correct before playing it
2. starting each bow stroke with a wispy sound to test the feeling before fully committing to a full sound
3. rushing
4. playing sharp
5. extraneous body movement (especially vertical)
6. playing with a hunched-over, “examining” posture
7. vibrato that is not musically motivated
8. portamento shifting that is not musically motivated
9. breaking up slurs with portato bowing

If any of these habits is allowed in practicing it tends to be amplified in performance, and if you are busy extracting information from the violin, you are not using the violin to express yourself.

We need a way to break out of this self-reinforcing pattern. The technique for doing this has been given a name by Malcolm Gladwell. He calls it “thin-slicing.” It refers to “the ability of our unconscious to find patterns in situations and behavior based on very narrow slices of experience.” Gladwell cites situations where the stakes are high. An insurance company needs to know which doctors are more likely to be sued for malpractice. People want to know if their relationship with a potential spouse is destined to be long-lasting. We are accustomed to assuming that such questions require weighing a huge number of variables. But Gladwell cites a researcher who can listen to 10-second clips of doctor-patient conversations and predict which doctors will get sued; and a psychologist who, watching one-hour videos of married couples, can predict with 95 percent accuracy, which marriages will last. Gladwell is quick to point out:

Thin-slicing is not an exotic gift. It is a central part of what it means to be human. We thin-slice whenever we meet a new

person or have to make sense of something quickly or encounter a novel situation. We thin-slice because we have to, and we come to rely on that ability because there are lots of . . . situations where careful attention to the details of a very thin slice, even for no more than a second or two, can tell us an awful lot.

It is striking, for instance, how many different professions and disciplines have a word to describe the particular gift of reading deeply into the narrowest slivers of experience. [p. 43-4]

Grandin has introduced her own kind of thin-slicing. She replaced the standard feedlot inspection checklist, which contained roughly a hundred items, with her own, containing only 10 items. Hers has proved vastly more effective in protecting animal welfare.

So thin-slicing is both a natural part of being human and a schooled ability of the specialist. What is unique about the performing situation is that it can challenge our ability to thin-slice both by impairing our natural mechanism for thin-slicing and also by awakening our natural addiction to seeking information: Where did that familiar feeling go? How can I find it again? Is this projecting enough? Is this the right bow-speed and pressure? Can everyone hear that surface noise or is it just me? What comes next? Will this next shift be accurate? Where is that note? With all these questions, we lapse into information-seeking behaviors.

Since we *are* in fact specialists, we can observe what special thin-slicing tools are a traditional part of our violinistic tool kit. If we cultivate these when we practice, they will be there for us in performance. Here are some that my students and I have found significant.

List of Information-Reducing Behaviors

Horizontal Motion

This is the slow, circular motion made by the top of the head and the scroll along the horizontal plane. Musicians use this motion to feel a sense of forward direction in the music. It enhances our ability to group musical units together into a single thought or gesture. It should be contrasted with the vertical motions one so often sees (bobbing the scroll or chin up and down) and serves as an antidote to that destructive habit. Students should learn to do horizontal motion very slowly even when the music is going fast. If practicing an isolated chunk, they should begin the horizontal motion before starting to play, and have it still going when they finish.

Thinking Metrically

Thinking metrically means imagining each metric unit before playing it. The metric unit might be the measure, but it might also be the half-measure or multi-measure grouping. To train yourself to think metrically, you play with pauses between the units. When necessary, you isolate and repeat a unit until it becomes a single, instantaneous thought, like the image of your earlier Line 2. It is helpful to anticipate the last note of a metric unit and aim for that note. I also recommend that each metric unit be played in a way that makes it sound complete and makes you feel physically balanced at the end. Metric practicing may seem un-musical since divisions of phrase and gesture usually do not occur on bar lines. However, it is actually deeply musical because it awakens awareness of, and emotional response to harmony; and it irons out rhythmic problems, making counting and subdividing unnecessary. All practicing involves dividing music into chunks, but it turns out that the work done on metric chunks really stays done when the chunks are put back together, and one isn't left with an overload of warnings and instructions to remember.

Using Bow-Strokes Derived From Martelé

We have already discussed the way martelé limits the information your violin can give back to you; but you may wonder where this leaves you when you are playing a cantabile line that does not call for martelé. The answer is that the little “click” sound at the beginning of a martelé stroke is actually the same sound that occurs between legato bow strokes when there is no change of speed or pressure. That click is vitally important to cantabile playing. It is felt equally by both hands and integrates the left-hand and right-hand experience into a single experience, giving the sound the beautiful focus and directedness of line two. Students may perceive the click sound as an unwanted accent that interrupts the musical line. Metric practicing with horizontal motion clears up this confusion, especially if you figure out the bowing pattern of the metric unit and practice it on a single pitch.

Thinking in Terms of Left Hand Rhythm

Practicing with the left hand alone produces the most obvious information-reducing benefit since it deprives you of much of the information about pitch. Under these conditions, you very quickly realize the irrelevance of groping behavior and start paying attention to the eloquence of the left hand rhythm. In fact most left hand behaviors, including shifting, articulation, vibrato, and finger patterns are more easily corrected when the “sound track” is turned off. Even pitch problems, once identified, are best corrected with the left hand alone, then adding the bow back in to check the result.

Conclusion

Many questions will come up in the implementation of these practice techniques and, clearly, an entire article could have been devoted to them. However, I chose to have this article be about something else equally important: the story you carry on stage with you—the story about what kind of creature you are and what your choices are. To summarize that story:

Under the stress of performance, we receive much more information than usual, and more than we can handle, with the result that

1. familiar things seem unfamiliar, causing us to
2. (ironically) seek even more information, but
3. knowing this story, we can choose to hang on to the information-reducing behaviors we have practiced.

In doing so, we discard familiar comforts, taking it on faith that, in the end, we won't miss them: Line one offers you a kind of certainty that line two deprives you of; a martelé stroke doesn't let you test the thin end of the sound before committing to the whole thing; an expressively rhythmic left hand doesn't let you grope for pitches; a well-articulated slur requires you to feel all the notes in a single gesture, and doesn't let you test each one as you go. When you use the thin slicing techniques suggested here, there may be a little voice inside that says “but I wanted that information!” You must respond to that voice with compassion and say, “just trust me, you will like this.” Thin-slicing neither guarantees a successful performance, nor makes the stage as comfortable as the practice room, but it provides the opportunity for a thrilling experience when the performer chooses to put a lot at stake.



Hailed by the *Washington Post* for “virtuosity and penetrating intelligence,” violinist James Stern has given recitals, chamber music performances and master classes throughout North America, Europe, and China including appearances at the Marlboro and Ravinia festivals. He is a member of two critically acclaimed ensembles, the Stern/Andrist Duo with his wife, Canadian pianist Audrey Andrist, and Strata, a trio in which they are joined by clarinetist Nathan Williams. He performs regularly as both violinist and violist with the Smithsonian Chamber Players, the 21st Century Consort and the Contemporary Music Forum. A former faculty member at the Cleveland Institute of Music, he is now associate professor of violin and chair of the string division at the University of Maryland School of Music in College Park.

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