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Profession: bowmaker



HOW I CAME TO THIS CRAFT AND
WHAT I THINK TO KNOW ABOUT VIOLIN BOWS

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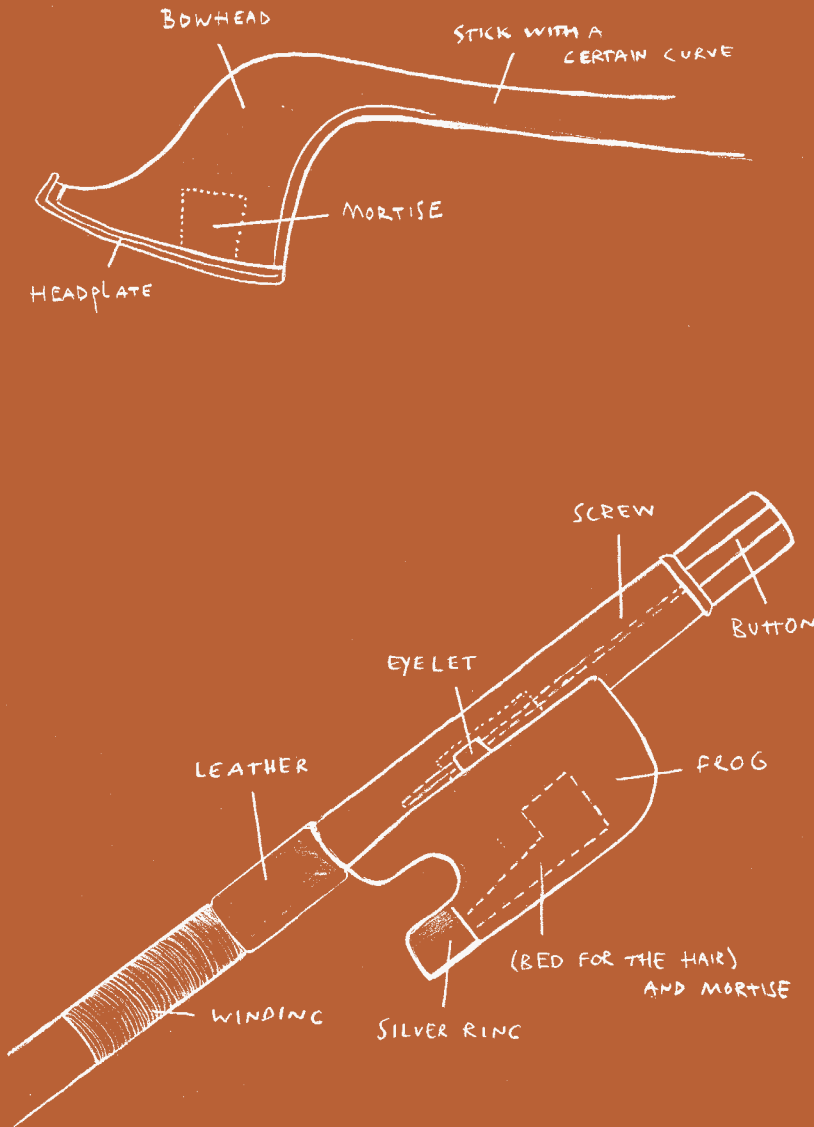
A secret wish

For some time I had the fantasy to be a guest on a Dutch television program about classical music. It was hosted by Paul Witteman, a famous TV presenter. I have come close to appearing a few times but somehow it has never worked out. In the meantime, I have thought about what I would say. I imagine it like this:

Paul: You're a bowmaker and I think that is a very special occupation. Do you want to tell us how you became a bowmaker?

Me: That's right, I make bows for stringed instruments. For me, this is a normal thing to do. In my world to be a TV interviewer is exotic. To get to know you is quite exciting for me and you must tell me your story too. But right now, it is my turn! My life in summary: I used to play the double bass in bands and studied some classical music. On the side I restored antique furniture. So, one day I came up with the idea to make a double bass for myself. From a friend I knew about a violinmaker's school in Cremona, Italy where a lot of young violinmakers from around the world went. I went there too. I didn't enroll in the school, but instead, made a double bass under the guidance of a Mexican student who was finishing the violinmaker's school.

I loved it and back in Zürich, my own city, I made another one in the attic of a violinmaker. It



took me another year to finish and then I had two basses and nobody showing up to buy them. That was financially not very auspicious. In Cremona they had opened a bow making class where you could get a diploma in two years studying and working 5 days a week every evening. Lazy as I was, I thought I could survive that and, in the end, I would have a diploma as a craftsman. On top of that, making a bow was much faster than making a double bass and much easier, I thought, but that didn't turn out to be true. In fact, I became more fascinated by bows than by instruments.

Violinmakers usually look down on bowmakers. But do you know what old violinmakers keep doing until they drop dead? They rehair bows. And rehiring is about the most boring part of my work.

Paul doesn't ask what the most interesting part of my work is, because that question is not written in his script.

Paul: I heard that there are some very expensive bows.

Me: Well, I guess so, lately I heard about a Tourte bow that went for 600,000 euros. You think that is a lot of money for a bow, right?

Paul: Yes indeed, I think that is a whole lot of money for a bow.

Me: Well, yes and no. If the average price for a Stradivarius violin is about 10 million, I would say that 600,000 for a perfect Tourte bow is way too little.

Paul: Maybe you are right, but then

explain why bows are cheaper than instruments – Is it because it takes less work to make them?

Me: You can make a violin in 3 weeks and after that you still must varnish it. You can make a bow in half of that time, and varnishing a bow is done much faster. Still, if you count the time that it takes to make one, that Tourte bow should cost 5 million. But there is another reason: a bow can break and then the value goes down by 90%.

Paul: That can happen if you let it fall, I guess.

Me: Yes, that's right, in fact I have brought a couple of them.

I pick one out of my bow case, tighten the hair, as every player does, and I let it fall on the ground. For now, I assume that the bow doesn't break right away.

Me: I really wanted to show you how a bow breaks, but this seems to be a tough one. Let's try it in another way. Could you get up, please?

I put the bow on his chair.

Me: And now sit down, please.

Paul: No, no, I don't dare, absolutely not!

Me, very firm: Just do what I say, it's for the show. And I have insured it! Haha not true! Depending on how and where it breaks, I would explain the

way to repair it, but the bow has lost its value anyway (it was a cheap bow of course).

Paul: That was a frightening experience, but I must admit I quite enjoyed it. Did you bring more bows to experiment with?

Me: No, Paul, I see you've got the hang of it, but please calm down now. I have brought other bows, which I made, and I think I can say it is somewhat my specialty: 4 classical bows. These bows don't have a silver ring on the frog or the button. Musicians in the classical time, from the young Mozart to Beethoven, used these kinds of bows. Today string players use modern bows for this kind of music. Modern bows produce a different sound than the authentic classical bows. I would like our public to hear the difference. We'll let the "in-house" string quartet, called "Fuse" play a short piece of Mozart with their own modern bows and afterwards with my classical bows. Let's see if our audience can hear the difference.

The quartet plays the piece first with their own, then with my bows.

Paul: I think I have heard quite a difference in the sound, why is that?

Me: Musicians adapt to their bows naturally, another bow makes them play differently, that is probably the main difference. I think with my bows the piece becomes more transparent, I shouldn't say it, but I prefer the sound of the

more authentic bows which I have made, even though the musicians are more used to their own bows.

Paul: I do understand your point Andreas, thanks, that was interesting, and if you need somebody to break more bows, you can always count on me, anytime.

Me: You are the first on my list!

My youth

When I was young and somebody would have told me I would later become a bowmaker, I am sure I would have laughed out loud. But when I look back, I see a certain logical progression in my career choice.



PICTURE OF ME 9 YEARS OLD
WITH SILVER MEDAL

I was born and raised in Zürich with a Jewish mother (born in Berlin and moved to Switzerland during World War II). Both of my parents were psychoanalysts, but don't pity me, it didn't spoil my youth at all.

Music was always around me, but it wasn't very important; even though two of my grandparents were musicians and I had some piano lessons. We lived in an apartment close to the lake with quite a big park around the house. In the winter we went skiing, and in the summer we had a house in the Italian part of Switzerland. Our parents gave me and my younger brother a lot of freedom and money was never a problem.

As a small boy I was rather introverted, but when I was 9 years old, I won a silver medal with skiing and my selfconfidence began to grow far above what I consider to be normal.

In the area we played, near our apartment, I was usually the oldest kid and I got used to having a certain authority. My brother and I learned some judo and that helped on the schoolyard. There is no youth without problems, but if I look back now, I was very lucky.

Thinking about bows

I like to think. That is probably a bit outdated, but it helps me to find my way in this complicated world. We are overwhelmed with far more impressions and information than we can digest. In this complete chaos I try to find some order and often I don't believe what people say or write. Maybe I am wrong, but usually I have a reason to believe or not to believe something. Truth is a construction made up of facts we believe illuminated by the light of what we already know. That is the way I also approach my craft.

Naturally I like to study the old master bowmakers. Unfortunately, there is not much information we can trust. Once I wanted to know which of the bowmakers of the last century were Nazis. I knew a descendant of the Bazin family. This family had produced three generations of rather famous bowmakers, I think the last of them was my acquaintance's uncle. He must have heard the stories in his youth, but he got quite wound up when I asked him about the history of bow making during that time, and he said that there were no Nazis, only some collaborators who worked with the bowmakers. It might be true, but I still don't believe it.

If we go further back in history, we have even less information, only birthdates and wedding or inheritance docu-

ments. We know very little about these figures from the past as real people. We do have the bows they made and when I look closely at their work, I try to imagine their character.

Let's take Persois as an example, one of the 5 biggest names in the bowmaker's world. He worked for many years in the workshop of Vuillaume in Paris. There he was once listed as a technician. You recognize his work mainly by the button and the style of the frog. But the heads and the sticks are very different from each other, so different that I can't believe they are made by the same hand. I imagine he was a technical person, very good with machines, but probably less handy with carving the head and the stick. Maybe he let other bowmakers do that in exchange for his machine work. I must admit that this is a wild theory which won't have much success with my colleagues. I could be wrong, but I do have my reasons to believe it.

When I look at a bow, at first, I don't see more than somebody who doesn't know anything about bows. Slowly some details appear to me which suggest a certain maker or at least a time or place where the bow could have been made. This first impression is quite unconscious and pops up out of the depth of my brain as just an idea. From there I try to support and fortify this idea and search for details which I would expect to fit. Unfortunately, I tend to overlook the details which don't fit in with my idea. This happens quite unconsciously. My brain prefers to keep to the first theory than admit that I was wrong. In my career I have made some awful mistakes judging a bow. I am ashamed of it, because when somebody else pointed out why I was wrong, I could hardly believe that I didn't see that too.

Thank God even the most famous experts make mistakes. I guess about 10% of the best certificates are wrong or have obvious shortcomings. The problem with that is, that nobody is interested in the truth. Certainly not if the bow is worth less than they thought. Bill Salchow, my teacher with

whom I spent time in New York (see later in the book), said once that some of the bows certified as a Dominique Peccatte (nowadays worth more than 100,000 euros) are made by Maline (less than 50,000 euros). Maybe he was wrong, I hope so for the owners of a Peccatte bow.

That is one of the reasons I stopped dealing with old bows, it doesn't feel right to me. I prefer to sell my own work, which gives me much more satisfaction.

Adolescence

When I was 12 years old, I went to high school, had a girlfriend, played piano and joined the scouts. When I was 15, I hitchhiked to Amsterdam and Copenhagen together with an older friend. There I smoked pot on a houseboat and everything was cool.

At 17 I had a steady girlfriend; her name was Esti. She was only 16, but quickly came to live with me. That was possible because my bedroom, which was originally built for the housekeeper, was outside the apartment of my parents. I was very happy to have that room, because my parents were going through a rough time together. They cheated on each other as much as possible with the result that there was always one of them in a bad mood. The air was thick, not only because of cigarette smoke. My younger brother who still lived with them, had to put up with this situation much more than I did. He started to suffer from migraines, and it took him much longer to liberate himself from it all. Later he became a musician and he is now a happy family man with a Puerto Rican wife.

As I said, the whole situation at home affected me much less. I had found a second father of my own choice

at my high school. He taught mathematics and looked quite impressive, a tall man with long black hair, a black beard and a bad posture. He wore jeans and a corduroy jacket. At school he was rather straight, but outside of school he would tell stories and jokes like nobody else. He laughed about his own jokes the hardest but in such a charming way you couldn't resist laughing with him. At our high school he was one of the most influential teachers and I was in the student union. Together with him, I had quite some influence in the school, or at least that's what I thought.



ME AND ESTI, ABOUT 20 YEARS OLD

And then it happened, the worst experience of my life up to that point. It turned out that my girlfriend went to bed with my adored teacher, my hero and second father. This wasn't a #metoo story, it was she who seduced him. I realized it when I saw her nicest pair of shoes lying around on the floor of his house. She was more than 16 and it was in the 1970s when we believed anything was possible. That made it very difficult for me. I was very hurt and jealous, but strangely enough this situation bound me even more to her in a slightly masochistic way.

When I told my father what had happened, he got very angry and wanted to tell the principal of our high school. But that wasn't what I wanted; I was too proud for that. I reacted the way I had learned from my parents.

I cheated on her as much as I could. But every time she found out, she went to see my teacher and I felt destroyed once again. So, I tried something new and told the German teacher, my second hero. He was also clearly left wing and fraternized with us, but he wasn't interested at all. Later the German teacher became the head of the socialist party of the city of Zürich. My math teacher became the head of the same party, but from the whole region in and around Zürich. Both had good careers.

A theory of my own

It seems that other bowmakers can recognize my work quite easily. I find that astonishing, because I think that every bow I make is different. There must be something all my bows have in common. Maybe it has to do with my aesthetics or with some characteristics I impart to all my bows.

An important idea is that I pay more attention to the passive role of the bow than to the active part, which is more obvious. I guess this makes me a little different from most bowmakers. To explain what I mean we need to look more closely at how the bow and the instrument interact.

Around 1900, Hermann von Helmholtz wrote a book about the acoustics of stringed instruments. Too bad he never really focused on the bow. His general idea was that the bow pulls the string until the tension becomes too strong. The string becomes loose and moves on its own until the bow gets a new grip on it. This would suggest that there is no contact between the bow and the string in between. That's the point where I disagree.

I think the bow hair and the string are in continuous contact with each other. Sometimes the contact is very firm and sometimes it is quite loose. The string vibrates and the bow vibrates with it, but there is always contact. (except with spiccato notes).

I compare this with skiing. If you want to change direction, you must bend your knees and give some pressure to the left or the right ski. If you want to go straight, you just let go of the pressure. Maybe you can jump, but you can't change direction while you are in the air. You need the contact with the ground. By the way, skis and bows have a lot in common. Most people don't know how to judge a new ski. They have a budget to spend, choose the coolest brand, which is just a little more expensive than the amount they wanted to spend. Many musicians buy a bow like that. They would be better off if they knew a bit more about it.

The salesman of skis probably holds the ski by the head and presses it in the middle to show how stiff it is. That is important, but more important is how the ski reacts to torsion. Many salespersons don't know that or don't explain it. A ski must turn easily, to achieve this it must be soft, specially at the head. But if the ski is too soft it gives in too easily to the torsion forces and slides away when you try to turn, especially on hard snow. If you ski slowly a soft ski is fine, but if you go faster the soft ski begins to vibrate and you lose control. And that's no good. A ski must become a part of you and something you can trust.

When I was a kid, skis were made of wood. Once I managed to break such a ski with a little jump. Later I got metal skis made by the brand Head with a Marker binding. They weren't new but I was very proud to have them. In fact, they were very heavy and not very fast, but still I liked them. Later they made skis from carbon fiber, which is much lighter and more elastic. And yet, the most expensive skis still have a core of wood, because wood is better in dampening vibrations. With skis it is all about the correct dampening,

the distribution of forces, the stiffness, maybe also the weight and length and, last but not least, the design. Am I speaking about skis or about bows?

The theory that the bow is in constant contact with the string results in a completely different picture of the role the bow plays in the formation of the sound of a stringed instrument. In this case, the instrument, the bow and the player are an entity that you can't separate. All three elements have a constant influence on each other. That's why it is impossible to measure scientifically the precise influence of only one part. The bow is in this triangle the most complicated part to individualize. Because on one way it moves the string and in another way it dampens the vibrations in its own characteristic way while lying on the string. That I call the passive role of the bow; how it swallows the vibrations and dampens them.

In fact, this is the main reason that we hear a different sound when a musician tries several bows. The musician himself probably thinks more in terms of the grip on the string, the volume and the behavior when playing spiccato on his instrument. All this I call the active part of a bow, which is certainly important. But still, the passive role of the bow makes the bigger difference in what we hear.

From the original vibration of the string the listener hears the frequencies which the instrument and the bow haven't dampened. Our ears are incredibly precise, they recognize the slightest difference in the overtone spectrum. It is a wonder! Especially when you look at the journey a sound makes from the string to the listener. When a musician plays his instrument, he produces a standing wave for every tone. The movement of the string is the tone itself. It is a basic note with a certain overtone spectrum. Up to now we can't hear much as the surface of the string is too small. Our vibration climbs over the bridge on the instrument, finds the place where it

can develop most easily and generates movement in the whole instrument. The instrument with its much bigger surface moves the air around it. This little motion of the air gets to our ears after having explored the acoustics of the ambiance. From the eardrums it gets converted into an electrical signal and this signal is interpreted by our brain as a sound.

The journey of the vibrations from the string to the instrument is quite well known and has been scientifically analyzed. I find it obvious that this vibration also goes in another direction, into the bow. The frequency propagates through the hair, squeezes through the different materials in the head and the frog and finally finds itself on the stick which moves too.

The musician feels the vibration of the string in his arm and his body. The musician and the bow absorb a great part of the original vibration. The whole idea of playing is to bring the vibration onto the instrument, that is the tone we hear. The bow brings the string in motion and at the same time it dampens the vibrations and gives it its characteristic color and power.

Everything we see, hear or feel is a reconstruction of the real thing in our brain. The incoming information is interpreted by the brain depending upon our experience and expectations. These replicas of the information we have in our heads are individually formed. When I'm listening at a concert, I won't experience the same thing as my neighbor. We are humans, not microphones.

A beautiful sound can touch us very deeply, but it is an individual feeling. Science can't really explain it, because everything is in movement and has an influence on each other. A bowmaker tries to get some control of it, but he is dependent on his intuition, he can't rely much on facts and measurements.

You can say that a bow alone doesn't do much. Only when a musician puts it on a stringed instrument does the

bow come to life. The music we hear is the sum of the active and passive roles the bow fulfills. The active role in the musician-bow-instrument triangle is 90% the musician, but in the passive part, the bow occupies a very important place. I think this is a logical idea and rather different than what Helmholtz described.

First steps in the real world

I stayed together with my girlfriend for many years and we had a lot of good times. In her way she was just as dependent on me as I was on her. There was a certain balance in it. She was an interesting woman, a fast thinker and emotionally very present. Laughing or weeping, there was always something going on. She was the center of attention, while I finished high school, earned some money, drove a Vespa or a car, and tried to keep her happy. In the last year of school, I didn't learn much, but I finished with decent grades. After that the general expectation was that I would study at university, but my experience with my math teacher had ruined my trust in the intellectual world.

Making things with my own hands was my way to rebel. My parents were not interested in this kind of activity. Washing the car on Sundays was about as far as they went. I had to learn everything on my own. The first thing I did was to become a gardener. I got up early every morning, ate lunch with a beer and in the afternoon, I went home tired but satisfied. I had never slept so well as during that time. One day, about three months after I started my gardening career we were working in the garden of "Frau Professor"

who lived in the same street as my employer. She had never been a professor but had taken the title from her late husband who had been a professor. She lived alone in a beautiful villa and we had to call her "Frau Professor".

On the second day a very old woman came to visit bringing some flowers in a basket. She rang the bell, but nobody opened. I asked if I could help and she told me that she had been a housekeeper in this house for many years. I told her that I was sure that Frau Professor was in the house and rang the bell three times more. There was no reaction, so I went around the house, climbed up the facade to have a look through the window and I saw her sitting there in a chair. I went back around the house and rang again holding the bell longer than one usually would.

Nothing, Frau Professor didn't open it, and the old woman went away saying she would come another time. As soon as she was gone, Frau Professor came out looking very angry and insulted me at length.

I didn't feel guilty at all, I must say, on the contrary, I was proud of what I had done. The next day our foreman, the master gardener, came running up to me and shouted with his too high voice: "You are fired, you are fired, go home, and don't come tomorrow morning!" When I asked for a reason, he said they didn't want Frau Professor to have another company do her garden. To calm her down they had to let me go.

I wasn't too unhappy about that, but I figured they had to compensate me. I went to the labor court with a well-prepared speech and won my case. I was very proud of that, especially because the company had sent their meanest lawyer. One of the gardeners told me that this lawyer has been an Italian fascist who had to escape from his country because of the things he had done during the war. That story was probably not true since he seemed a bit too young for that but he was feared in the company and yet I won.

A month later I got an invitation to come to the same court again. I went there, still full of myself and in hoping to get more money, but this time the fascist had prepared his speech well, and I lost the case. That's the way things go in the real world.

I still didn't know what to do with my life. I had some vague fantasies about living in a commune in the countryside. It never happened, and to be honest, I still do think about it.

My father advised me to become a teacher. "That is a respected profession, and you can still do anything you want," he said. In fact, with my grades from high school I only needed to study for one and a half years to become a teacher. I thought I could put up with that. It wasn't the nicest time of my life, but afterwards I could start working right away as a substitute and it paid very well. At that time, there weren't enough teachers.

On the side, I worked in an antique shop, restoring furniture. There I learned to use some woodworking tools. For the owner of the antique shop, I was the young teacher and among teachers, I was the craftsman. I enjoyed not being identified with only one thing.

My girlfriend and I were leftists, or what now you might call sort of "salon communists". We went to every demonstration and ran through the tear gas. It was the early 80's, the time of the *Bewegung* or so called *Opernhauskrawalle* in Zürich. How can I describe it? – maybe as disillusioned young people against a boring establishment. We fought for an autonomous youth center, and we did finally get it. That was a triumph. It took off very well. All kinds of young outsiders gathered there, a very mixed bunch of hippies, punks, artists, musicians, alcoholics, karate kids, actors, filmmakers and drug addicts. They all respected each other and there were always something going on. Once we removed the asphalt from a parking place under the motto:

Under the asphalt is a beach. There was no beach, the police came with teargas and we ran, as we were already used to doing. Another time we constructed a favela on a little island in the river and named it Chaotikon. It ended in the same way.

My girlfriend and I lived very cheaply, so that we could save some money to go away. The *Bewegung* turned into a disaster in no time. The drug addicts took over and the different groups started to fight with each other. I still don't understand why so many nice utopias end up as a catastrophe.

I wanted to continue looking for a better world. First, we thought about traveling to Spain, but I wanted to go further away, to Mexico. The reason could have been in the books of Castaneda, which were popular at the time. And I also loved the stories about Mexico written by B. Traven.

Facts about horsehair and rosin

Most string players believe that horsehair has scales on the surface, which keep the rosin on it. After using the bow for some time, they think that the scales are worn off and therefore the rosin doesn't stick anymore to the hair. Prof. Jan James from Amsterdam has done research on it and found this idea to be misleading. He published it in his book and in an article in the *Strad* magazine, but it didn't really get through to most musicians. James proved that rosin sticks to horsehair because of their static charge; the surface of the hair plays a minor role. This static charge keeps the rosin from flying around or attaching to the string. Rosin and horsehair have been used for more than a thousand years. Up to now no synthetic alternative has been found.

Another thing about horsehair: people, usually use white hair. It comes from dead horses in Mongolia and Siberia. A Chinese tradesman buys it and brings it to the north of China, where people are poor and labor is cheap. They wash the hair and then it is tied in a gigantic knot. They must disentangle it and select it on length and quality. That is a lot of work, child labor, I guess, they have better eyesight.

Most white horsehair is sold as unbleached. I don't believe this. There are just not enough white horses to be able to sell so much white hair. Those dealers seem to have their own idea about what washing and what bleaching is. Because the market is now asking for unbleached hair, they have started to color them yellowish.

Recently I found some brown hair to buy. It seems to me that it is untreated because the color of the single hairs is

quite uneven. When I do a rehair with brown hair I take the white ones out, they are usually no good. I think they come from old horses.

Even more important than the horsehair is the rosin. Rosin from stone pines is cooked to make turpentine. The hard part which doesn't evaporate is the colophony you put on the hair of a bow. Together with my teacher in New York we bought a big bag of rosin from Greece. We warmed it up until it got fluid and poured it into little molds. That was it, Salchow colophony ready to sell.

Some brands add other kinds of rosin to it, for example elemi (a rosin which never dries) to make it stickier. That is necessary for most double bass players. The anthroposophists (followers of Rudolf Steiner) mix it with metal powder, but I have no idea why they do that. The most expensive one has gold dust in it, although gold doesn't combine with any other material. I don't understand its purpose, but my wife, a professional bass player uses it.

In fact, up to now, there has not been much scientific research done, at least as far as I know, even though colophony is crucial for the contact between bow hair and string. Without it you can't produce any sound from your instrument. The hair just glides over the strings. I don't know when exactly the idea sprang up to put colophony on a bow so that one could create a continuous sound instead of plucking the string. I think it happened in China several thousand years ago. From there it came to the Persian empire and around 1200 to Europe.

The special quality that colophony has is its ability to change viscosity in no time. At 20 degrees (Celsius) it is hard, at 30 degrees it is sticky and at 80 degrees it is already boiling.

The friction caused by moving the hair on the string raises the temperature in milliseconds from 20 to 30 degrees. The adherence changes with every degree. The warmer it

gets the stickier, until it becomes too fluid to move the string. When a string player varies the weight of his right hand, he changes the stickiness of the colophony. He "plays" with the viscosity of the colophony without knowing it. Intuitively he finds the right pressure, or you could say the right temperature, to have an optimal contact with the string.

Something else most string players don't know is that colophony oxidizes over time. Oxidation makes the molecules about 5 times bigger, they become too heavy to stick to the hair. A piece of colophony can last a couple of years, but it doesn't get better with time. If you don't use a bow for a couple of months and then you try it again, it won't play as it used to. The main reason for that is that the colophony has oxidized on the hair. In this case you should wash the hair with alcohol to remove the oxidized colophony.

It is hard to say when a bow needs to be rehaired. Professionals usually come once a year. Some of them have broken half of the hairs, others nearly none. Hairs break when they get squashed between the string and the wooden stick. They can't take that for long. The less hair there is on the bow, the more pressure the musician will put on it and then it can happen that a whole bunch of them break at once.

Some string players don't break any hairs, but they still come for a rehair, saying the bow doesn't have grip anymore. That is another phenomenon. While playing the colophony changes temperature the whole time. This alters the chemical structure of the colophony, it becomes a glaze. That glaze becomes hard and won't stick anymore. Even when you put new colophony on the bow it doesn't help, because the static charge has been weakened. You can try to rub the glaze off with alcohol, but you can never clean it completely. It can help a bit when you are on tour or have no time to get the bow rehaired.

Sometimes the hair becomes too long. The hair is under tension for a long time and after about a year of playing the



individual hairs have become a couple of millimeters longer. Their ability to lengthen has an advantage. When one rehairs a bow it is impossible to get each hair under precisely the same tension. But the shorter ones will get a little longer within some days until the tension is spread evenly. A new rehair needs a couple of days to be at its best. Also, horsehair gets longer in the summer when there is more moisture in the air. Once the air gets drier, they shrink back to their original length.

Most string players put too much colophony on their bows. They rub it in at the tip and at the frog and then they play the whole time in the middle of the bow. That doesn't make sense in my opinion. Some other players put too little colophony on, that is also not a good idea, because when the bow doesn't have enough grip, they tend to give more pressure than necessary, and the sound becomes shrill. I would say one should pull the bow twice over the piece of colophony before playing, once a day should be enough.

The primitive form of a bow is very simple. Horsehair on tension with a stick, colophony on it and you can play. One time I made this kind of bow together with several music teachers in the hope that they would afterwards make them with their pupils. They had to finish it in a day, it takes me not more than 2 hours.



The sound and movement of a good bow has more nuance, but I must admit that the simple bows played better than expected.

Mexico

In Mexico we saw and learned a lot of new things. The first month we lived at the house of a Swiss cameraman. He had a housekeeper, Betty, who was a native Indian. From her we learned a lot of Spanish words and the first lessons in how you should behave. She did everything in house. We weren't used to that and after dinner we wanted to wash the dishes. She stood unhappily beside us and we understood that we had taken over her task. Our intention was to help and that went wrong, as it often does when you want to do something good.

Soon we understood that people treat each other in a whole different way. In Mexico it is not necessary to prove yourself, be interesting or helpful, your presence seems to be enough. That was a liberation. In addition, you should always agree with the other in a conversation. The word "no" doesn't really exist, the furthest you can go is backing away.

You soon become part of a clan; they will do everything they can for you. On the other hand, they expect total loyalty to the clan. We got used to it, especially because the advantages were very comfortable.

After one month in Mexico the Swiss filmmaker told us to go somewhere else. He hadn't become completely Mexican in his ways. We started to travel. Esti wanted to see every ceramist in the country. I went with her, but I was more interested in music. In between our trips we always came back to a Mexican family who had adopted us. I had gotten their address through friends in Europe, and we felt very welcome at their home. The father of the family has been the head of the airport tower until he lost his job during a union strike. To earn some money, they had a little butcher shop in Mexico City, where I helped now and then. Both parents were good musicians too. The father played the guitar, mother could sing very beautifully, and I played the double bass. Since I was 15, I had played in various bands and studied some classical music. We learned a lot of Argentinian and Mexican songs and spent many nice evenings together.

Through them I got to know other musicians and one day I was invited to play bass with a famous Argentinian band. Before they came to Mexico, they were the band of Alfredo Zitarrosa. On their own they were called Sanampay. They had a project where they needed four string players who could read music and accompany them. At that time there were many fantastic Mexican musicians, but not many who could read music. That was my chance. With them I played in the biggest halls of Mexico. First, I didn't have my own bass, but then a bass was built for me in an Indian pueblo where everybody made instruments. I think it was then that the idea formed in my head to make a bass myself.

Because I played with Sanampay, other musicians, also Argentinians, thought that I was a good bass player and they invited me to join them. Mexicans are blindly loyal; Argentinians are not at all. They make new alliances every day

and break the old ones. The latter scenario happened to me a couple of times. I must admit that I was no genius on the double bass, and they were probably right to find somebody else.

After about a year and a half, I started to miss Europe, the more profound conversations, the different seasons and the freedom not to feel so much commitment towards my friends. I was also starting to miss Esti who had returned to Switzerland earlier for work.

My return soon became a disappointment. Apparently, I had become "Mexican" while my girlfriend had lived on lentils and bread for half a year. The first thing I did was to buy very beautiful and absurdly expensive shoes for her to cheer her up. She turned pale when she unpacked them and I didn't understand why. A day later she told me that she had been with my math teacher again because she had had the impression that I had had quite some fun over there too. She had a point, but I couldn't understand why she had to tell me. In Mexico you would never reveal something like that if you didn't want to get killed. I just cried a bit and we still stayed together for a couple more years. But the relationship was essentially spoiled from then onwards.

Baroque bows

When you think of baroque music the first thing that comes to your mind is Johann Sebastian Bach, even though there is much more baroque music than his alone. But Bach is played by every string player. My inspiration to make a baroque bow comes mainly from Bach. My neighbor, a well-known viola player, once had a bag printed with *Don't touch my Bach*. First, I didn't understand it, but it seems that every musician has his own idea about how to play Bach. It is something very personal and I too have a strong opinion on how Bach should be played. As far as I know Bach composed on an organ or at home on a harpsichord. He thought in chords, not in melodies. The melodies get their form through the harmony, not the other way around. To make this obvious a baroque bow helps a lot.

In baroque times there was a lot of church music. Noble people had a lot of free time and played music together in their beautiful homes. Ordinary people had music for their weddings and other festivities. The bows they used were made from European wood and didn't look very elegant.

Bows for the noble people were made from snakewood with ivory frogs and buttons. Snakewood or *Brosimum guianense* comes from Suriname and it must have been very expensive. Ships liked to put it in their hull to add weight. Snakewood is one of the heaviest woods that exist. If you put it in water, it sinks like a stone. It is not a tropical wood as in the tropics everything grows too fast. Snakewood comes from drier subtropical climates. In Suriname the indigenous people used it to make bows and arrows while chiefs often had a sort of scepter made from snakewood. A bowmaker colleague with origins in Suriname once gave me one as a present.

It is still legal to export snakewood. For the original inhabitants who live out in the bush it is a way to make money. They cut the trunk, carry it home and cut off the white outside of the tree with a machete. From time to time a timber merchant comes by and buys it, most probably for an unfair price.

SCEPTER FROM SNAKEWOOD



Snakewood produces a different sound than pernambuco. You could call it cold or pure. In fact, there are fewer overtones in the sound, especially fewer high dissonant ones. The wood absorbs them due to its high specific weight and its relatively low elasticity. A high elasticity of the stick is good for high frequencies, a lower elasticity enhances the lower overtones. The high specific weight creates more mass which makes the bow slower in its reaction. This makes a good combination with gut strings which can be a little bit nervous.

Baroque bows are softer and lighter than modern bows. They are also a little shorter and very thin. You can't put much vertical pressure on the string. Often a baroque bow produces less volume than a stiff modern bow, but the carrying capacity is astonishingly good. The instrument can breathe more freely, because there is less pressure on it. You

also get a more sustained sound. The somewhat longer ring makes the sound you hear more complex and polyphonic.

To play baroque music with modern bows is very outdated, said Anner Bylsma. My Aunt Lena already knew that years ago. She was the sister of my grandfather and had lessons with August Wenzinger and Hannelore Müller, the pioneers of authentic interpretation of baroque music. My grandfather, who I admired deeply, wasn't so impressed. He made fun of her and said it doesn't sound good at all.

In the meantime, we have had Nikolaus Harnancourt, the Amsterdam school with Anner Bijlsma and many famous musicians who all pretend to play in an authentic way but they all sound different from each other. There are obviously different opinions on what we can call authentic.

Also with bows, we don't really know what is authentic. Some bowmakers believe they do know because they have found a bow in the hand of a baroque angel on top of an old organ, made in 1650, but we still don't know if everybody played with a similar bow. On top of that, the bows played in Italy were not the same as the ones played with in Germany or France. The music also changed about every generation and bows changed as well. I think there were many kinds of bows, long ones, short ones, heavy and light ones and made from different woods. In fact, we don't know how they played their music in baroque times, nobody has been there and not everyone played in the same way. Everything that is called authentic is an interpretation.

That's why I developed my own baroque model, it is my own interpretation. It started about 30 years ago with a picture of a bow with a bird head in a book about Joachim Tielke, the most famous Viola da Gamba maker around 1700. Whether the bow in the book is really and originally made by Tielke himself is questionable, but I don't care. I liked the idea of a bird flying over the strings. A friend of mine, Regula Weidmann, with whom I gave guitar making

THE FIRST BIRD HEAD BOW, MADE IN 1986



A BAROQUE BOW AS I DO IT NOW



classes and who was at Cremona before me, was good in woodcarving. She carved the bird's head and I did the rest of the bow, a frog with an inlay of wings and a button that looked a bit like a bird's tail. Since then, I have followed this model, but in a more abstract form.

The model I use now is based on the first attempt. Since then, it has gone its own way, but I still try to achieve some authenticity taking inspiration directly from baroque music. I prefer that instead of copying an old bow from which I still can't be sure if it is representative of a certain place or time.

I think mainly about the mathematical games they have found in the music of Bach. For my baroque bows I use the figure 3 as a base and then use as many exponents as possible in my measurements. It is a piece of architecture where everything is in a certain proportion. Wherever I can, I try to repeat the measurement. Maybe you don't see it right away, but I hope it gives the bow a certain coherence. That is my concept.

In baroque architecture you can see that every movement has a counter movement. I do that also in the form of my bows. You can see that if you look at the contour of the head and even better in the frog and button. I believe one

hears that also in baroque music, every tendency has an answer. I try to pick that up in my bows.

During Bach's lifetime, musicians used a clip-in bow. These bows stay on one tension, you can't turn the button, there is no screw. Clip-in bows often produce a beautiful sound on an instrument. Maybe the reason is the lack of metal on these bows. There is less dampening of the sound. But for somebody who is used to playing with a modern bow, it is technically very different from what they are used to. The height difference between the hair and the stick is too great. This means you can't apply any pressure to these bows, if you do, they just bend over to the side. Playing chords is easier, so that is an advantage.

Most of my clients choose a baroque bow with a screw. Bach had probably never seen such a bow, but his sons certainly did. I try to make a bow which can be used for a wide range of music. The authenticity suffers I must admit, but it is my own model, based on what I know about baroque music and from the old bows I have seen. These bows should fit the way baroque music is played nowadays. Even if somebody doesn't use gut strings (bad idea) it still sounds baroque.

CLIP-IN BOW



New York and Cremona

To earn some money, I gave workshops for unemployed teenagers. I was a teacher and I knew how to work with wood. With the first group I made loudspeakers and with the second and third we made electrical guitars. At that time, I still didn't know very much about instrument making. I gave the classes together with the friend who helped me to make the first baroque bow with a bird's head. When she was living in Cremona, I had visited her back in the 70's and that's how I knew about Cremona, even though I wasn't interested in violins back then.

To learn more about electrical guitars I went to NY and got the chance to work for the famous guitar maker Roger Sadowsky. I did the easy routine jobs, but it was great to be there. We had Prince, Paul Simon and musicians from the Madonna's band as clients. That was cool, even though they weren't my heroes. I was more interested in salsa, jazz and South American music. My friends were mostly Latinos and a couple of Jews. NY was nice but compared to the good times of the *Bewegung* in Zürich, it was rather quiet and orderly. Back in Zürich the *Bewegung* went down the drain. A lot of my friends were in a sort of depression. It was time for something new.

I went to Cremona to build a double bass for myself. Cremona was in those times, at the end of the 70s and the beginning of the 80s, just emerging from the Middle Ages. In an obvious contrast to the people of Cremona there was this international group of enthusiastic young violin makers.

Under the guidance of a Mexican student at the violin-makers school, I made my principal bass. The woodwork

took me half a year and then I had no more money and had to go back to Zürich. There I made another bass in the attic of a violinmaker and did some repairs for him. Slowly I realized that I wanted to go further in this direction. But I wasn't ready to sit in a school again for 4 years, I had seen how bored some of the students were in the violinmaking school of Cremona. On the other hand, I knew that I would need a diploma.

In Cremona they offered an evening class in bow making which took only two years, every night from 8 to 11. I thought that would be the easiest way to get a diploma. Young violinmakers usually look down on bowmakers as they think that it is not the real thing. At first, I didn't have any intention of becoming a bowmaker, but little by little I became fascinated by it.

The construction of a bow has many parallels to instrument making, but to make a bow takes less time than to make a double bass. That gave me the possibility to experiment.

The class was given by maestro Lucchi. A charming man who learned the trade by himself. At his time there were nearly no other bowmakers in Italy. He had a little tremor in his right arm, there was always something moving, a twinkle in his eyes or a shoulder turning around. When I asked him something he started to talk, but not about what I had asked. Nevertheless, I learned a lot from him. He thought in an analytic way and explained to us why something is done in a certain way. At the end of the two years, he asked me to stop calling him maestro, just Giovanni would do. I was disappointed, he was my maestro and not any old Giovanni.

After finishing the school in Cremona, I knew I had to continue learning. At that point it would have been a good idea to go to Paris to work with one of the famous bowmakers. But in France craftsmen are quite hierarchic and I

thought I couldn't cope with that. I chose NY and worked there for different violinmakers repairing and rehairing bows. Much cooler of course. Finally, I went to work for William Salchow for half a year. Nearly all American bowmakers learned from him. I worked 3 days a week for him and the other 2 days he let me make my own bows. From Salchow I learned to appreciate the old masters and tried to copy them. I would have liked to stay longer with him, but then I would have needed a Green Card and that was hard to get.

For financial reasons I left Cremona and went to live in the vacation house of my father in the south of Switzerland. It was close to Lago Maggiore, the surroundings were a paradise, but I didn't really enjoy it. I was a little bored there, something I can't understand when I think about it now. As soon as it was possible I went back to NY to stay for some time and worked for different violinmakers.

Classical bows

A classical bow has a higher head and an open frog, there are no metal parts on it aside from the screw and the eyelet.

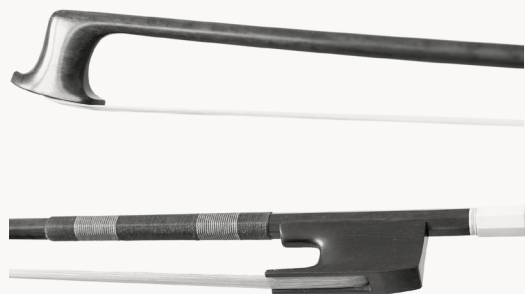


Classical bows were played circa 1770 to 1840. That was the time of the sons of J.S. Bach, Haydn, Mozart, Schubert and the young Beethoven. It is the period of music we call classical. This music is played nowadays mostly with modern bows but if you have any ambition to play in an authentic way you should use a classical bow. The interest in classical bows is growing, but a lot of string players still don't know anything about them.

Although the modern bow had already been invented (shortly before 1800), string players in the German speaking part of Europe still played with classical bows. Especially in Vienna they were very conservative and disliked the modern bows. I have heard a story that they returned a couple of FX Tourte bows with the message: *doesn't work*.

The classical bow has its origins in Germany according to recent studies. Until now French bowmakers were convinced that everything good in bow making had come from them. And they still believe that. But in fact, the period of classical bows started with the Mannheimer Schule, a famous orchestra that even Mozart was impressed by. This is how the bows of the Mannheimer Schule looked, more or less. It is called a hammer head model.

CLASSICAL BOW WITH HAMMER HEAD



The construction with a higher head created a new problem. The head could easily break, especially when they fall on the ground with tension on the hair. This is because there is more leverage in a higher head than with the lower baroque heads. Bowmakers of that time found a solution to this problem. The hammer head tips were wide in the front, where they were subject to the strongest forces and become thinner at the back. Modern bows are made the other way around. In fact, the construction of a hammer head makes more sense than modern bows. First, I found them ugly, but now I see their beauty.

One could ask the question why it was necessary to make a higher head, what could have been the advantage of it? The only reason I can come up with is that one creates

enough space to give the stick an inside curve. The advantage of an inside curve is that you can tighten the hair a little more without the stick bending too far away from the hair.

That makes spiccato playing easier. They say the Mannheimer Schule had a lot of dynamics in their playing and for that time a high spiccato. In baroque playing the bow should always remain on the string, said Anner Bylsma.

Composers and instrument makers have always had a huge influence on each other. Who came up first with new ideas? I believe it were the instrument makers. Composers wrote for the instruments they knew; the other way around doesn't sound very credible to me. Bowmakers have adapted to every new fashion and made the bows they could sell best. If we study the old bows, we can deduct from them how people played in their time, up to a certain point of course.

Even in earlier times there were different opinions on how certain music should be played. For example, there was a debate about where to hold the bow, at the frog or further towards the middle. There were two sides who fought over this for many years.

The hammer head bows and with them a new way to play music drifted over to Paris with the famous violinist Cramer. In France they called this model a Cramerbow. Paris was at the time the cultural and political center, all of Europe was looking up to. The craftsmen there started to gain more self-confidence and the first bowmakers put their names on the bows they made. We know Leonard Tourte, the older brother of FX Tourte, and some other names as Meauchand and Duchaine.

The time before the French Revolution is called the Rococo period. Noble people had become a little worn out by all of their partying, theaters, picnics in the countryside and making music. In the lower class the voices against the feudal system became stronger. The power of the guilds wasn't as

strong anymore as before. The craftsmen and the businessmen stood up and demanded more freedom and dignity. Previously a woodworker wasn't allowed to use any metal, that was only permitted by another guild. Those laws stood in the way of progress. Craftsmen from different guilds started to work together which created an explosion of creativity.

One can see that also in bow making. There were different kinds of bows, everybody started to experiment, new models, and all kinds of ornamentation and different woods were tried out. Often, they used ironwood.

There are about 200 species of ironwood, and nearly nobody can tell them apart. Sometimes it is the same specie but it looks different and has grown somewhere else. Sometimes the wood looks similar but is in fact a different sort. Most of the wood is very hard and heavy. Some early bows of Leonard Tourte are made from ironwood, and they are so thin and elegant you hardly dare to touch them. The frogs and buttons are made from ivory, and so thin they are nearly transparent. Bows like that were certainly made for the nobility and I have the impression that looks were more important than playability.

The hammer head model went out of fashion, and the swan head model came in. Sometimes this model is called "transitional" because it led the way to the modern bow. These bows are lighter, especially at the tip. I guess music had become faster and more technically demanding. The first bows were made from pernambuco, frogs and buttons were mostly made from ebony.

Pernambuco is also called pao brazil. In fact, the name Brazil originates from this type of wood. The first discoverers of South America brought it back home. At that time, it was used as a red dye, which was considered an expensive and luxurious color. The Portuguese had a monopoly on selling pernambuco. Around 1800 they couldn't keep that

up and Napoleon made an end to it. That was the time pernambuco came on the market.

In Amsterdam we had the "Rasphuis", a "tuchthuis", or prison. There is a description how the female prisoners in there had to rasp pernambuco. Tears ran through the purple dust on their cheeks. Very moving for a bowmaker.

Classical bows combine the best with gut strings. I personally prefer it that way. I understand gut strings get out of tune and are a bit nervous to handle, but they have a richer pallet of overtones. If you play with a classical bow and gut strings, the volume will probably sound less to your own ears. But in the concert hall it will sound astonishingly beautiful and attractive.

Tuscany and my wife

What I really wanted was to buy a house in Italy with some of the friends I had made in Cremona. One day I went to visit one of them who was living near Florence. He had just bought a house in the hills, together with another couple. The house was completely a ruin, but the area and the view were very romantic. Apart from the big house there was a small stable and I asked them if they had plans for it. I could buy it for a ridiculously low price. For two years we all became builders making new walls and everything you need in a house. I loved it; we did everything together. I had imagined that we would build a big workshop for instrument making, maybe even start a little school, but that didn't happen. The other violin maker had no desire for something like that. Today I think he was right. That was a great fantasy; the reality is more complicated. In the end we split up the house and everybody now owns his own part, and we are still good friends. In the summer when I am there, we often get together, eat together, make pizzas in the big pizza oven, drink and make music.

When my house was ready, I met my wife, Annette. She is a bass player and was already working in a big orchestra as first bass. I knew right away that she was the woman with whom I could live together and have kids. She is German and hasn't been to Mexico, and when she gets the chance to say no, she grabs it. And when something is in her way it is "Scheisse". We have now been living together for more than 30 years and we get along very well.

The first time we met was in Amsterdam, although I was still living in Tuscany. I was working there together with Paolo Sorgentone, my neighbor and we had a little work-

shop in Florence. Business wasn't too bad, but Italians have their own way of buying things. Teachers wouldn't pay for a bow. Instead they would send their pupils as new customers. The pupils did pay, but a little bit at a time and sometimes they needed a little reminder. I found this complicated and unpleasant.

ANNETTE WITH DOUBLE BASS



In Amsterdam it was a different story. In those times there was more money in the music sector, from baroque to very modern. The level of most musicians was also higher than in Italy and my clients paid the full amount at once. This protestant mentality had obvious advantages. In addition, the rents and the house prices were quite low, and my wife was very happy with her job in the Netherlands Chamber Orchestra. Enough reasons to move to Amsterdam. I love Amsterdam, but it wasn't that easy to say goodbye to Tuscany. Whenever Annette had some free time from her orchestra we went back to Tuscany. The kids were born there and spent a good part of their first years in Italy. Once they were in school in Amsterdam, it became more difficult to spend much time in our house in Italy. Now they are grown up, Annette and I go there to maintain the garden, drink cheap biological wine and eat great food.

I had met Annette in the workshop of Willibrord Crijnen where I worked when I was first in Amsterdam. From him

I learned to do more than just copying, not only the general idea, but also the little mistakes of the maker and the worn-out places of an old bow. Since then, I haven't had a teacher. I still learn things from musicians and sometimes from other bowmakers. I try to learn on my own, with every new bow I change a little detail. That helps to get more control over what I do and what the consequences are if I do something in a different way.

Modern bows

It all started with Francois Xavier Tourte in Paris. From now on, I will call him FX. His father was listed as a carpenter, but we know that he had also made 40 bows and delivered them to somebody, I don't remember to whom. He worked in a sort of monastery where the craftsmen were out of reach of the guilds. That was a very fortunate situation at that time.

His first son was called Leonard, his second son was born 11 years later and that was FX. Leonard established a good name as bowmaker, probably the best of his time. He worked for the nobility and imitated their clothes and affected way of behaving. When the French Revolution came he got into problems. He had to hide outside of Paris for several years. That was a difficult time for him, he had health problems, maybe he was depressed or a hypochondriac. He had a much younger wife, but I don't think that could have been the problem.

Before the Revolution Leonard made very elegant classical bows, often from ironwood with ivory frogs and buttons. I think he became quite dependent on his younger

brother when he had to hide. FX saw his chance and took the workshop over. Before the Revolution Leonard was the boss, but after the Revolution he stood in the shadow of his younger brother.

After the Revolution the up-and-coming tradesmen also wanted some luxury in their lives and they didn't know any better than to imitate the noblemen's lifestyle. They made their children learn the piano and the violin, often with little success. The music halls became bigger and there was an enormous amount of sheet music printed. Some soloists became megastars.

FX lived in a whole different world than his older brother Leonard had. As an 11- or 12-year-old kid he was sent to an uncle who was a watchmaker. At the time watch makers were the scientists of craftsmen. FX learned to work with metal, gold and silver. This knowledge he introduced to bow making and revolutionized the bow making process. They didn't teach him to read and write, he probably just had to work all day long.

After 6 years with the watchmaker, he came back to the workshop of his brother as an apprentice. At first Leonard just made him do the metalwork, the screws and eyelets. In the evening FX went to the workshop secretly and made bows from old planks of wine barrels. I have never seen such a bow, but that's the story I have heard.

FX was a very different person than his brother. He was short, strongly built, and a quiet and reflective guy. His early bows resemble those that Leonard made and we often don't know which of the two had made them. But when Leonard had to hide during the Revolution, FX had the workshop to himself and started to experiment. He put a silver ring on the frog to spread the hair and covered the hair with a plate of mother of pearl. On the button he put two silver rings to protect them from wearing out. His whole life he never stopped trying out new things. Even today it happens that we think we have a

new idea and then it turns out that FX had already done it. We don't know with certainty if it was he who used pernambuco as a bowmaker for the first time, but most of his bows are made with that wood. He had a very good eye for the quality of the sticks. He didn't necessarily choose the best looking, but he always used very heavy and dense wood. Today it is hard to find wood of the quality that he used. Not all the bows which are said to have been made by FX are very beautiful, but they all have something special. Leonard was the aesthete, FX thought more about function. He had direct contact with the best musicians in Paris and listened carefully to their needs. From the violinist Viotti we know for sure that he went in and out of the workshop. FX became famous all over Europe. A bowmaker who became famous was a completely new thing. Only in the German-speaking part of Europe did FX have less success during his lifetime. In France and even in England most of the bowmakers started to copy him.

As far as we know FX never had an apprentice in house. His wife died quite early and he remained with his daughter who was his housekeeper. She never married, but just took care of him. His daughter wasn't allowed to work with him; the only thing she had to do was to select the hairs for the bows, which is not the most interesting part of bow making. This information came from the composer and collector Joseph Fétis, who wrote about him many years after FX had died. We don't know what is true, but there isn't much more information. That maybe is because FX himself couldn't write. In that description of Fétis we don't get the idea of a happy family. I think FX was very focused on one thing, his bows. He was a genius inventor, but not much of a social guy.

The first generation of bowmakers who copied him in France, were Persois, Eury, Lupot and Lafleur. Bows made

by FX sold for about 5 times as much as the bows of his followers. Now a Persois is about half the price and the others maybe a third of a FX bow.

In England there was the family Dodd who started to make modern bows with silver parts. They had their own style and interpretation of the FX models. They used very heavy pernambuco, often spectacular to see, but technically a bit slower and rather heavy at the tip. Based on these characteristics of the bows I deduct that the way of playing must have been different from how they played in Paris. I think they played slower and were in search of a deep and rich sound. That's what the bows tell me.

From about 1820 Jean Baptist Vuillaume from Paris dominated the whole market of stringed instruments and bows. He had a great influence on bow making for nearly the whole century. Vuillaume was a slick businessman and a very good violinmaker, that's for sure. He was the first to take Stradivarius' violins seriously and made copies, which his customers couldn't tell apart from the originals.

Vuillaume studied the bows of FX, but came to the wrong conclusions in my opinion. He made a diagram of a Tourte bow where the diameters of the stick were analyzed. He concluded that the diameter of the stick decreases gradually in a very precise way over the whole length. This is something I have never seen in a bow made by FX. Vuillaume's conclusion is typical for his time where uniformity was the new aim. *Liberté, égalité et fraternité* was the slogan.

For his clients Vuillaume was a charming man, but for his staff he was a mean bastard. Once, a bowmaker, I think it was Voirin, had worked a full week on a lathe to make the sticks round. It was not a success; the machine didn't work. Then Vuillaume didn't want to pay him for that week. That was too much and all the bowmakers went on strike and

threatened to smash the windows of the shop. Vuillaume had to give in. He wasn't a nice boss, nevertheless, most of the best bowmakers of their time worked for Vuillaume, at least for a couple of years.

Vuillaume also bought bows from Mirecourt, which was to France what Cremona was to Italy, and sold them in Paris for 5 times as much. Those were the times. An invention he came up with must be mentioned, the self-rehairing bows, he was very proud of that. Today we doubt if he really was the first to invent it, but he was the first to have a patent on it.

The favorite bowmaker of Vuillaume was Dominique Peccatte. There is only one picture of him as far as I know. You see a slightly bold man in his forties with a mustache and thick eyebrows. He looks a bit uncomfortable. I imagine him as a sort of bear, though someone of few words and with golden hands. For many years he was the head of the bow making workshop.

The bows of Peccatte nowadays are nearly as expensive as those made by FX. They cost a minimum of a hundred thousand euros. Peccatte's bows often have a deep warm sound and a large volume. But if you look at the details of how the bows were made, he wasn't the most careful bowmaker. He worked with verve; you can nearly see the movement of his knife. If you compare FX with Stradivarius, Peccatte would be Guarneri del Gesù.

While I was learning bow making with Salchow in NY I copied the old master bowmakers, but until now, I have never tried to copy Peccatte. His nonchalant but striking accuracy can't be imitated. Precision you can approach, but intuitive geniality is out of reach, for me at least.

Around 1850 Nicolas Voirin became the chief bowmaker in Vuillaume's workshop. Voirin was a very different character than Peccatte. He made very cleanly finished bows of a feminine elegance. Many of these bows are reputed to be too light for the needs of string players these days. That's why

a Voirin bow costs about a fourth of a Peccatte. It doesn't make sense, but that is the way the market works.

Voirin was the most famous bowmaker of the romantic period. At present people think they must play romantic music with a lot of pathos and heavy bows. But in fact, the bows in the romantic time were particularly light. If you want to play romantic music in an authentic way, use a light bow and of course, gut strings.

Steel strings came into fashion only after the Second World War. These strings produce a bigger volume, but they don't necessarily carry the sound better in a hall. They seem to be louder closer to the ear and they stay in tune. That is an advantage, of course. Steel strings have a higher tension than gut and work better with stronger and heavier bows. That is why most old bows got a new heavier winding made from silver instead of the silk which they used earlier. The steel strings have a sharp sound to them which is dampened a bit with the heavier winding. When a client comes to my shop and is looking for a bow, my first question is: what kind of strings do you play on? Light bows work better with gut strings, heavier bows are better with modern strings.

Turning back to Vuillaume, he became a rich man with a big workshop and many employees. In 1870 the FrancoPrussian war began and everything went down the drain. France sank into a deep depression, many bowmakers were killed in the war, and the young generation had a hard time to survive with bow making.

I am less interested in the bows made after 1900. Most of these bows were made in a half industrial way and have less character. Of course, there were some very good bowmakers, Sartory, EA Ouchard, the Bazin family and the Morizot's, but they are not my hero's. I rather appreciate the German school. For that we must go back in time again.

German bows are generally cheaper than French ones and that's not fair. Maybe it is because the Germans have produced many more bows than the French, I think probably 10 times as many. The main production was situated in a small area at the border of Czechoslovakia in and around Markneukirchen. The first known bowmakers who settled there were protestants who took refuge there. From that moment on the production increased steadily. Most of those makers made decent, well-functioning bows, often less elegant than the French. But not all of them, there were also some fabulous bowmakers in the families of Knopf, Bausch, Nürnberger and Pfretschner, all of them big families who made bows over generations. A big part of the production went to the States, clients didn't show up very often. They had to sell their bows through traveling salesmen who went to music shops all over Europe and took orders. Sometimes those shops put their own names on the bows. In this case it is not easy to know who the maker was. Sometimes you can guess, but it is very difficult because they all worked together and some makers were specialized in making half-finished parts.

Bowmakers today in Germany and in France try to make bows that go beyond the perfection of the bows made in the last century. Or, some of them invent wild ornamentations on their bows. That is not my ambition. I try, rather, to bring the bow back to its essence: a beautiful sound, elegant and natural forms and a good feeling in the hand. For more than 20 years I had worked hard copying the old masters, until I met the legendary violinist Ivry Gitlis. He was already in his 80's. He came to give a concert in Amsterdam and stayed at our house for some days. We became friends, something I am very proud of. He was as a young man about the only pupil of Heifetz that was accepted by the master. Later Ivry played with all the celebrities of his time, even with John Lennon. But he was

never as famous as Yehudi Menuhin. Ivry was a bit jealous of him.

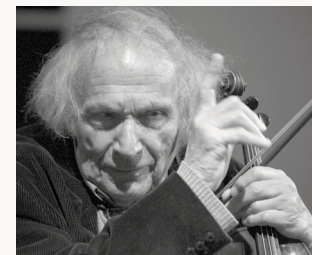
I think Ivry didn't get so famous because of his bad temperament. He could be the most charming man, but if somebody got too close to him, he panicked and became a devil. Unfortunately, I have experienced that too, when I invited him to a festival I had organized in Amsterdam. He behaved as badly as he could and we had an enormous conflict. Later, before he died, we got together again. I am still flattered that he had put away a Persois and a Pécatte bow to play with one of mine. He didn't give many concerts anymore, but he still played and taught young musicians every day.

Ivry told me something which was very important to me. He told me that it was about time to do my own thing instead of copying other people's bows. They were the right words at the right moment. Since then, I make bows which I call the Gitlis model. They don't look all the same, but I don't restrict myself to models of the old masters, I do my own thing. These bows are mostly on the light side, react fast and have a direct contact with the string. They work the best with gut strings.

IVRY GITLIS



FOTOGRAFIE: BEN RONOUVRER



Every new bow I make is a new concept, based on the characteristics of the wood. Every stick has a sort of DNA, certain qualities you work with to bring it in balance. To make a bow is a little bit like bringing up a kid, they have their own character, which should be respected, but you can take off the sharp edges. Usually, while I work on a bow, there is a point when the bow becomes rebellious. That is the moment when I should be very careful. I impose my will but do it with the greatest respect for the wood. Once we are through this crisis, everything becomes easier. Sometimes during the whole making process there seems to be no problem at all and at the end the wood doesn't accept the varnish. Sometimes it happens right at the beginning when I bend the stick over a flame, and it just doesn't want to accept a straight curve. Every stick is different, but they all go through a crisis sooner or later.

My biggest hero besides Ivry is Gordan Nikolic. When he plays, I have the feeling I really understand the music, whatever he plays. He is the concertmaster of the Netherlands Chamber Orchestra, where Annette plays the bass. He too is not as famous as he should be, but for a lot of musicians he is a great authority. We have known each other for many years and every time he comes by there is something new happening, something I don't understand right away. One time, for example, he turned the eyelet in the frog just half a turn so that the frog was sitting a bit looser on the stick. And it sounded different, clearly better. I was quite astonished, because I would have expected the opposite, the tighter the frog sits on the stick the better. But making it looser gave the bow an extra spring which seemed to improve the sound. Another time he took his shoes off and put a special Japanese sole into it, and yes, again it sounded different. That time I didn't try to find an explanation.

Sometimes he asks me to change the curve of one of his bows. These are expensive bows, when I hold them over the flame it is a bit scary, a little too hot and the stick turns black. A minimal change in the curve can have an enormous effect. If the curve is right, the bow plays more easily, and the sound becomes deeper and more attractive. Gordan is a great inspiration to me, continuously trying new things. One time he told me not to be such a perfectionist. I felt quite helpless, but it was a comment to think about.

There is no such thing as an ideal bow. Every bow has advantages and disadvantages even the most expensive ones. The reason for that is the double role of the bow, creating motion and dampening the string at the same time. And that is not the only paradox we encounter. A bow should bounce easily for spiccato playing and lie down quietly for legato. There should be a distinct beginning of a note and at the same time bind one and the next note smoothly together. Fast changes of strings are required and at the same time the bow should hold its direction. These are opposite characteristics, if you have more of one, you get less of the other. We still want to have all these advantages together, to reach the impossible is the target.



**GITLIS MODEL
BOW**



Tennis and violin bows

When I was young my eyesight was still good, but I didn't have a very precise idea of the forms I wanted to create. Now I know what I want to do, but I can't see as well. I use a magnifying lens over my glasses, the whole day long. Okay, that is resolved, you probably think, but the lens forces me into a bad posture. From the bad posture I get pain in my neck. To prevent that I sport nearly every day. What I like the best is to play tennis. I think playing tennis has a lot in common with playing a stringed instrument. If you can compare a racket to a bow, the ball would be the string. A good racket with a perfect stringing helps but doesn't make a good player. It is important how big the racket is and what form it has, the weight, the balance, the elasticity and how it lies in the hand (just as with a bow). You must choose a racket which fits your style, and you must adapt to the characteristics of your racket, just as a musician should adapt to his bow.

One of the most important things one should be aware of while playing tennis is to know where your racket is, the angle in which you hold it, when to strike out and how to pull it through. This is not very different with a bow in your hand. Furthermore, it is important where on the racket you hit the ball, in the middle you have the most power. With the bow one could say it is about the place where you make contact with the string, at the tip in the middle or at the frog.

The racket should make a figure of 8, so you use its weight without forcing it. That is precisely the same thing with a bow. In tennis you can play harder and better balls if you keep your wrist flexible. The movement of the racket

can become a whiplash and has much more effect than pure muscle power. Many string players could learn from that. Many tennis players put a little damper in the strings of their racket. It helps to let the racket vibrate less in your hand. This is comparable with the winding on a bow which is also a damper.

Tennis is a position game; you must anticipate on what you think the other player will do next. Good musicians do that too, some can read the music up to a whole page ahead. They listen what the other musicians are doing and react to it. With tennis you must work continuously on the basics, forehand, backhand and service, they are the scales for musicians.

In a concert musicians cannot always be at their best: one day you make stupid mistakes one after the other, that happens sometimes to me with tennis. One could draw many more parallels between tennis and playing a string instrument, but my first editor thought that it was bullshit. She doesn't play tennis of course but for that reason I'll leave the tennis comparisons here.

My way of working

I want to come back to the question what I like so much about my work. I work alone and enjoy that, no boss to tell me what to do and I can follow my own rhythm. Every new bow is a project I do from the very beginning to the end and where I can try out something new.

My last experiments are with the button. It seems that the button has a much bigger influence than I originally thought on the functioning and the sound of the bow. I realized that when I had to make a new frog and button for an old stick a friend in Vienna had bought at an auction. She was lucky it seemed to be a Francois Peccatte the brother of the famous Dominique Peccatte.

First, I made a button in the style of Francois Peccatte. The bow was very soft and sounded as if it was at the end of its life. I was quite disappointed. Then I made another button from ivory as many bows in that time had. It was simple, heavy and not finished very carefully, but I tried the bow again. To my surprise it changed the bow entirely. I felt immediately that I had a master bow in my hand. I gave it to Gordan Nikolic to try the two buttons and he too found the ivory button so much better.

Until now I haven't really found out why. I don't think it's the balance, that change is too little and hardly measurable. I tend to believe that the button receives the vibrations of the stick and pushes some of it back into the stick. A heavier button dampens more and lets the bow do its work without being disturbed. You can compare it to a loudspeaker which must be as stiff and heavy as possible in order to let the membrane move freely, without interference from the enclosure. I often make two different buttons for

my new bows, and the heavier buttons are usually better. Isn't that curious?

Of course, there are parts of my work which are less interesting. For example, the finishing, I have no fun doing that or rehairs for new clients, leather wraps or head plates, these are just routine jobs. Not that I hate it, but it is just not very interesting to do. My purse likes it though.

In my daily schedule I am some sort of a robot. At 12 PM I am in bed and at 8 AM I get up. First, I have breakfast and then I sport, preferably playing tennis, after that I do my rehairs, one or two a day.

Time for lunch at 1:30 PM, which has to happen fast. After a cup of coffee, I do my groceries with the list I have made the day before. That's a typically Swiss habit, one of the better ones, as it is fast and efficient. That is something I am always looking for, the most efficient way. Tidying up is one thing that helps. Clearing the kitchen, for example, is a thing I do 5 times a day. In our family nobody else does it since Papi does it anyway. To be honest, I don't mind, I even enjoy doing it. Call it a diversion, I don't care.

In the afternoon I can finally start to work on my bows. I can work until 6 or 6:30 PM, after that my concentration is gone. Generally, I force myself to stop at the right moment. I want to go on, but stupid mistakes usually happen at the end of the day, when I just want to finish something. I know that from experience, unfortunately. It is much better to leave it as it is and start cooking and drink a glass of wine. But I won't leave the workshop without tidying up.

Sometimes I get a special request from a musician who knows exactly what he or she is looking for. In that case I need to come out of my comfort zone. It is not about what I like, but what the musician wants: a higher frog or a very low one, a longer stick or a shorter one. These changes create a long chain of consequences, which I have to combine into a logical totality.

Making the frog and the button is precision work. That doesn't come easy to me, and I am not always completely happy with the results. It could always have been better. I then find some consolation in telling myself that precision is not the only goal. It is more about distinct lines, forms which seem to be so natural you hardly notice them. Yes, this is a peculiar thing. It happens while I am working. I am filing something round or hollow, filing, filing, filing and suddenly there comes a point when I don't see the form anymore, as if it has disappeared. That is the moment when the form reaches the expectation I have in my mind.

Our brains are trained to notice things which are not in line with our expectation. When the form I was working on vanishes, it's because my brain doesn't find it interesting anymore. Funny, isn't it?

Something similar happens when we look at a great old bow. Maybe the work isn't very precisely done, but the intention of every line is obvious. We overlook small irregularities where the bow is damaged or worn, our brain corrects them. It happens unconsciously and we are not disturbed by those irregularities. On the contrary, they awaken our sympathy, because there is a reciprocal action between ourselves and the object. We understand the intention and that gives us satisfaction. Just as listening to music.

The total precision of a machine we find boring and unattractive. While we love an old beaten bow, even when it is full of marks and scratches, when it is made by a good bowmaker.

Even more important than a bow's looks, is how it feels in your hand. Our hands are incredibly sensitive. A difference of a tenth of a millimeter is clearly felt with our hands. That's why I feel my frogs with my thumb while I'm working on them. I think the old French bowmakers did that too. They worked more with the feeling of their hands than relying on their eyes. The older you are the worse

your eyesight gets. But the feeling in your hands doesn't diminish. In the past they didn't have good glasses. They probably didn't see a thing. I am sure they used their hands.

The last one of our 5 senses is the nose, in fact the nose doesn't help much in bow making. On the contrary, the fine dust of pernambuco and ebony are slightly poisonous. Some bowmakers are allergic to them. I am not and I think it is due to my smoking dark shag tobacco. Maybe it doesn't sound very plausible, I know, but I will try to explain it. The tobacco smoke is composed of about 2000 different substances. Some of them are very poisonous and you can get cancer, all right, everybody knows that. But not everybody knows that there are also some good substances in tobacco which have a disinfecting effect. The Native Americans put tobacco ash on their wounds. And they were very wise, everybody knows that too.

Unfortunately, smoking also clogs your veins up. But to counteract that you can drink alcohol. I do that regularly. To keep everything in balance I sport, that is the punishment, but I gladly accept it.

Until now I have explained how complicated it is to make a good bow and how subjective the judgments on a bow inevitably are. But there are a couple of basic rules which are valid for all bows. It must stay straight if you tighten it, otherwise you lose energy and control. It must pull through evenly. In other words: the grip of the bow on the string should feel the same over the whole length of the stick. To obtain that, the curve, and the development of the thickness of the stick must be in balance. At the tip the stick is thinner but has more curve. At the frog the stick is thicker and has less curve. This curve ratio is very sensitive. If it is not correct the bow doesn't work at its best. Many old bows suffer from this. A bowmaker can adjust the curve by holding the stick

over a flame and heating it until it takes the right form, preferably without getting black. You do need some experience to do this. Most violinmakers don't like to do it. Musicians don't even know that it is possible, even though it can make a significant improvement. Very small changes in the curve have an astonishingly great effect.

Also, the balance of a bow can be changed. Violinmakers and dealers have put heavy silver windings on every old bow they have had their hands on. This was a good idea when one is using steel strings, but the original balance of the bow is gone, of course. Putting on a silk winding brings the bow back to its original state and often makes an antique bow rise to its old glory. I think it is always a good idea to bring a bow back to its original state.

Once I had a Dodd cello bow with a silver tip. The very last outer tip of the silver had broken off. That is a difference of maybe 0.2 gram at the most. My client wanted me to repair it, I tried to get around it, but there was no way. So, I did it. It was quite a lot of work and rather difficult to do, but I managed. She was overwhelmed how good the bow became with the new tip. I could hardly believe it, but it is remarkable how sensitive string players are, they feel everything, the smallest changes. Well, that's what they have studied for many years.

In most professions you are good when you are young. When there's new software, young people like that and find it handy, while people over 50 hate it and don't understand why this is necessary, the old system was working too. In my profession one doesn't need to understand new systems. It is more about understanding the old systems, their way of thinking and being able to place it in the history of music.

When I finished my study in Cremona, I went to Switzerland to visit some well-known violinmakers to show them my work and eventually sell something. In Lausanne I went to P. Gerber, a famous violinmaker who had 2 secretaries

and a couple of Strads on his bench. First the secretaries told me that Monsieur Gerber didn't have time, but then he suddenly appeared from his workshop. He looked down at my bows and his expression didn't promise anything good. He went to his workshop and played some notes. When he came back, he looked somewhat friendlier. He said the bows didn't play badly, but he thought that I had to see more old-master bows. I didn't agree at all. If my bows played all right, why should I care about the old stuff? Maybe I said it too, but I hope I didn't.

When a young bowmaker comes to me and shows me his work, I say precisely the same thing Monsieur Gerber told me. As a young person one is mainly self-involved. After a number of years, that gets boring and one starts to look around. That helps to get a better perspective. With more routine one can concentrate on the important things. You work with more focus, more efficiency and accuracy. When I look at bows I have made 30 years ago, I see some nice details, but as a totality they don't make sense.

A BOW WHICH DOESN'T MAKE SENSE



Why this bow is not any good? To begin with the model of the frog is stupid and it is too massive and heavy. On top of that, the stick is somewhat short and made of perambuco, which is certainly lighter than snakewood. That gives a strange balance and a sound with too many high overtones, thin and unclear.

Differences between the instruments

The 4 stringed instruments are the violin, the viola, the cello and the bass. They all need a fundamentally different bow. For each bow the length, weight, balance, stiffness and grip are different.

In an orchestra half of the string players are violinists. I think that's more than enough. The violin sounds the loudest, because its range of frequencies are those to which the human ear is most sensitive. Why are there so many violins then? I don't know, but it is what we are used to now. It's usually hard to hear the viola section even though they really do their best. The cello and bass sections have it somewhat easier, even though they are in the minority.

I will try to make the difference between the sections clear, but any categorizing isn't true every time, it is a generalization.

The violins and certainly the first violins have the most notes to play. They need a bow which is not too heavy and is easy to handle, especially when changing strings. It should bounce well and be precise with fast notes. A lot of curve on the stick should provide that. A fast reaction and a clear beginning of every tone are important for the first violins.

The second violins are a little different. They often don't have the melody, but the middle voice. They usually want a heavier stick so that they can be heard by the public. If one sits in the middle of the orchestra, it is sometimes difficult to hear yourself. A stiffer bow can help. Their bows can be a little shorter, 5mm already makes a big

difference. Most second violinists want a stiffer bow than the first violinists.

The viola players have one big problem: their instrument is too small for the range of frequencies they cover, when compared to the violin and the cello. To have the same proportion of string length and body size they would have to be 10 cm longer. That would not be playable, as it would be much too big. All violas are small, that is the reason they often sound a bit nasal. On top of that there are fewer players than in the violin sections. They work hard to be heard and often play with too much pressure on the bow. That doesn't make the sound more beautiful. Good old violas cost even more than violins because there are so few available. With bows it is the same, they are expensive and hard to find. For light viola bows I don't have many clients, but if they are too heavy it is also not good. Then the players will get a tennis elbow or tendinitis. A perfect viola bow doesn't really exist in my opinion.

Cello bows are shorter than violin and viola bows. They are also heavier and stiffer. Cellists seem to be quite relaxed when you see them playing, but that is a deception. They must lift their right arm all the time and that is hard on the shoulder. A bow that is too heavy increases the chance of shoulder problems. A bow has leverage and that works against the cellists. They can put a lot of pressure on the frog, but at the tip that's much harder. That's why cellists need a particularly good grip at the tip of the bow.

The balance point can be nearer to the frog than with a violin or viola bow. That way cellists lift less weight with their right arm. I like to give cello bows a silver winding for that reason, something I try to avoid with violin and viola bows.

Nowadays, everybody wants to play loud, certainly the cellists but if you play with too much vertical pressure, the sound gets more distorted, because of too many dissonant overtones. A sound with a lot of distortion is perceived

as loud by the audience. If somebody is screaming, there is also a lot of distortion and our brains interpret that as loud. Too much distortion is not pleasant, just as it is not pleasant to hear somebody screaming. As a bowmaker it is not easy to find the good balance between a big but still beautiful sound.

I was a bass player and my wife is a very good bass player, so one could expect that bass bows would be my specialty. That is not the case. I don't have many bass players as clients and I try to avoid rehairing bass bows. Bass bows need double the amount of hair of a violin bow and they are 3 times stiffer. All the forces are greater in a bass bow. Maybe the fashion is to use somewhat lighter bows now, but even a light bass bow has double the weight of a violin bow. All bass bows are very different from each

GERMAN BASS BOW



FRENCH BASS BOW



other. The instruments, as well, are different in size and construction. A bow that works well with one bass is no good on another instrument.

Basses have the same problem as violas, they are too small for the range of frequencies they produce, which is hard to believe I know. In 1850 Vuillaume had already ordered a bass with the right measurements compared to the cello and the violin. They called it Octobass. It is 3,5 meters high and very wide. It is in the Musée de la Musique in Paris. Two bass players are needed to play that monster, one stands behind on a ladder and the other one in front of it with an enormous bow. Not very handy, of course.

Bass players must deal with an instrument that is half the size it should be. In fact, this is not a big problem,



because we don't really hear very clearly the deepest sounds a bass can produce. Our ears or our brains guess the basis of a very low sound from the overtone range.

From all stringed instruments the bass has the biggest palette of overtones we can hear. That can become too much as too many dissonant overtones make the sound unclear and unattractive. Most bass players aren't bothered by that. They practice extremely hard on pieces which are not written for their instrument and forget the old saying: *c'est le ton qui fait la musique*. Though my wife, I have to say, pulls an enchanting sound out of her old Italian bass.

There are two types of bass bows. The German model is played with an open hand just as the gamba players do. With this kind of bow one uses less vertical pressure than with a French model. The bass player must play with a loose and flexible wrist to bring the string in motion. He or she uses more hair to get the string to the aimed frequency. Therefore, the German models are longer and lighter. The French model is played the same way as cellists do with the hand on top. These bows are shorter, stiffer and heavier than the German models.

AVERAGE MEASUREMENTS

| | Height frog | Weight | Balance point at | Overall length |
|--------------------|----------------|-------------|------------------|----------------|
| Violin | 17,5 – 18,5 mm | 55 – 65 g | 19 cm | 72 – 73 cm |
| Viola | 19 – 19,5 mm | 67 – 75 g | 18 – 19 cm | 71,5 – 72,5 cm |
| Cello | 20 – 22,5 mm | 75 – 85 g | 15 – 17 cm | 69,5 – 71 cm |
| German bass | 40 – 50 mm | 110 – 130 g | 10 – 12 cm | 68 – 71 cm |
| French bass | 28 – 31 mm | 125 – 150 g | 12 – 14 cm | 66 – 70 cm |

A pupil

Right after my study in Cremona I got my first pupil, Jeroen van der Linden. He wanted to make a baroque bass bow. I wasn't ready for that, but since I also had made my first bass under the guidance of a pupil of the violinmakers school, I couldn't say no.

We started with the button. We bought the steel screw from a supplier, something I still do. You place the screw in a piece of wood and then it goes into the lathe. Jeroen made an absurdly big button in the form of a key. Well, why not? I was very open-minded at that time, not having a lot of knowledge about traditions in bow making.

I helped him a bit with the frog, but the mortise, the hole for the hair, he had to do on his own. That was difficult for him. I told him that it is always about the hole and not about what is around it, and that helped a bit. In fact, the mortise must be chiseled out very carefully. Later the hair goes in there with a plug on top. If the plug doesn't fit right the hair will come out while playing. And to fit the plug you need the walls of the mortise to be cut very precisely.

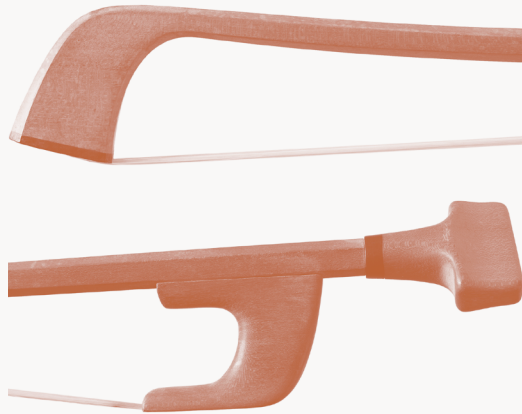
The height and the form of the frog depend on the hand of the player. With violin bows the difference is maybe one millimeter, with bass bows it could be 10 millimeters. I had a beautiful plank of cherry wood. He had to cut out the raw form of a stick. Once he had the stick, he had to plane it, first a straight square and then 8 sides. That is quite a task for a beginner. All 8 sides should be straight, have the same width and become gradually thinner towards the head. Every bow is conical, thicker at the frog and thinner at the tip.

Once he got that approximately right, he had to bend the stick over an alcohol flame. With a bass bow you need to use quite some strength. He was anxious about breaking the stick, but it didn't happen. It did burn a little bit, but that could

be removed later by further planing. After the stick is curved sometimes it twists a little. That can be shaved straight again, though with caution. From time to time I helped him a little. We kept the head very simple and then he had to cut the second mortise in the tip of the bow. He did his very best and worked on it for hours. I still remember that I had told him the mortise was a trapezoid on top and a square at the bottom. After a several hours he came to me saying: "That's not possible, if you want the walls to be flat." In fact, he was right, that is the disadvantage with intelligent pupils, they put a finger on an obvious blunder.

It still happens that I learn something from my pupils. From Jeroen I had learned to listen to classical music in a more analytical way, to distinguish different themes, to recognize passages and musical humor.

When the bow was ready to play, he was a little disappointed about the sound and the playability of his bow. It was not as good as the old bows he was used to playing with in his orchestra.



JEROEN'S BOW

Other bowmakers and the finish

There are not more than 10 professional bowmakers in the Netherlands and more than 30 violinmakers. Violinmakers sell and rehair bows, but I know only one who makes both, instruments and bows. We bowmakers are in a quite comfortable position I must admit, but none of us has become rich with our profession.

We work hard for our money. If I make a bow and immediately sell it, I have earned well. If I don't sell the bow, I still have had my usual expenses without any incoming money. We all have bows hanging in the workshop and waiting to sell. Most of them will sell sooner or later, but I still must pay my bills. To make a modern bow I need between 30 and 40 hours of concentrated work. A baroque bow takes half the time. I guess that is about the same for other bowmakers. We can't complain but we still do.

Young bowmakers starting out have a hard time. First, they need tools, some machines, they need to buy wood and materials, and then it takes years to get known. You need perseverance to go through all of that. A way to become known internationally is to win a competition. This path was never open to me. I hate competitions, certainly in the field of music and instrument making.

To judge a bow is very difficult, it is a question of taste. You can compare details, but quality is not a sum of details. It is about how they are in proportion to each other and that is hard to judge and put into numbers. The only thing you can judge is the ornamentation and the finish.

Young musicians must participate in competitions to find a place in the music world. In these competitions a little mistake counts more than sound and musicality. I think it is because of these competitions that young musicians often play too loudly and perfectly, but that's a bit boring. The emotion seems to be faked because they have studied the piece to death.

Some years ago a Japanese bowmaker came to my shop, he is somebody who had won several competitions. I thought his bows were made very carefully and were precisely cut. But his aesthetics were not mine. I felt sympathy for him because he told me that he smoked his bows like salmons. He thought the wood improved with this treatment. I loved the idea and tried it too but without success.

When he came in, I asked him if he wanted to see the house, because most people find it quite impressive. I hoped to win some points like that, but he wasn't interested, all he wanted to see were my bows. I chose a couple of bows of mine I was proud of and put them on the table. He put his glasses on and soon started to groan as if he was about to faint. And then he said: "I can't see the wood." That was a hard judgment and I immediately lost some of my sympathy for him.

Later when I thought about it, I had to admit that probably there was some truth to it. I think it was the finishing which didn't impress him. The wood wasn't smooth enough before varnishing and I had put some ammonia on them to make the wood darker. That affects the surface too and doesn't pay off on the long term. I don't do that anymore and I try to be more careful with my finishing.

It is not easy to obtain a nice finish. With my knife, my plane and a metal scraper I create a nice form, but then the surface of the wood is not smooth enough. I use sandpaper as little as possible. If you use too much sandpaper it will

look like an anthroposophical toy. Aside from that when you use sandpaper, there are always little pieces of it one rubs into the wood. I prefer to use abrasive mats, but they also ruin the form I have cut. Then, I must use my knife and scraper again to restore the original form. And then clean it again. This process repeats a couple of time until I lose my patience.

Choosing the right moment to decide when the piece is ready is not easy. If you work too long on a piece it usually doesn't improve it. The making of a bow begins with a concept and during the process adjustments are made. With too many modifications there will remain a vague piece that probably looks clean at first sight, but with no inner logic and conviction.

Even before varnishing I test a new bow, any bow, on my double bass. I presume that if a violin bow can get a bass in motion, it must be easy on a violin. Often, I am quite satisfied with the sound and the way the bow functions and I think, at that moment, that I have made a really great bow.

Then I start varnishing. For many years I believed that a varnish should be as soft as possible. I know that Stradivarius' varnishes are so soft that it leaves a mark within one night when you put a clamp on them. Thinking of that, I was convinced that a hard varnish was a stiff corset which prevents the stick from moving freely. What Stradivarius did can't be wrong. Lately I have changed my mind as I discovered another aspect. Very old wood is as hard as stone on the outside and becomes softer the more you shave off. old bows are good, that's a premise and what I strive for. And the old bows must have a very hard outside. So, I went back to the antique way of varnishing, a thin shellac polish. Lately I have found another good reason to use shellac. It is an electric insulator with no static charge. That helps to stop the colophony dust forming a layer on the stick when the bow is played enthusiastically. The traditional way of varnishing is the best solution, once again.

As primer I use propolis to close the pores. Bees use that stuff to seal their beehives. It is also sold as medicine for a sore throat, because propolis lays a thin disinfecting layer on the skin. Can't do anything bad to my wood, but even after using propolis the pores are still not closed completely. That is an old problem.

Many years ago, I asked Roger Hargrave, a famous violinmaker, how one should close the pores. He said: "You want to fill the pores? Use a pore filler". Every time I am varnishing a bow, I repeat that to myself. I use a very fine glass- or stone powder and rub it into the pores, which product you use is not so important. After that a layer of shellac is applied which has to dry for some time. One layer is usually not enough and the process starts all over again. The varnish shouldn't become too thick, the thinner the better. Once I am satisfied with the shellac varnish, I use some beeswax to finish it off. That gives it a warm, mellow luster. Ironwood and snakewood don't need shellac, they are already hard enough, a layer of beeswax is sufficient.

After varnishing I have to decide what kind of winding I want to put on it: silver thread, silk with a silver coating, or only silk. A heavy silver winding will bring the balance point closer to the frog. If I want the balance point closer to the head, I use only silk. I place a little leather grip on modern bows, sometimes even on the classical ones, never on baroque bows and then the bow is ready, eureka! With high expectations I try the bow on my bass, and in most of the cases it is quite a disappointment. The bow played better without the varnish and the winding and it sounded nicer too. The reason for that is probably the varnish hasn't completely hardened yet, and that could take weeks or even months. The winding is anyway a mute. That could be a good thing on some bows, it could give more depth, more roundness in the sound, but one loses overtones.

To improve the bow, I put it in the Tonerite for 3 days. That is a little machine which makes the bow vibrate softly. These vibrations have a positive effect on every bow. Why it works I haven't yet completely understood. We all know that a new instrument gets better over the years, especially when it gets played a lot. Why shouldn't that be the same with bows?

It is still some kind of a mystery how this breaking in of an instrument changes the wood. I do have a theory, but I can't prove it. I think it has to do with the alteration of the cells during aging. When cells get older, they dry up, the cell walls get harder and inside the cells forms a very fine dust. Vibrations shake that up and this very fine dust comes loose inside the cell. The vibrations make this dust dance to the rhythm of the music and impede the highest overtones, the most dissonant ones. The fine dust eats them up turning their energy into movement, those overtones are muted, which makes the sound recognizable and more attractive.

The breaking in of an instrument could also be explained in another way. It has to do with the distribution of the moisture in the wood. With old wood around 10% of its weight is water. Humans have about 90% water in their bodies. I always found that a bit of an insult. Anyway, the moisture in the wood, especially in the top of the instrument, will distribute after some playing in a way in which it doesn't disturb the vibrations too much. Every frequency has a favorite spot where it can develop easily. That is well known with a recorder, but with stringed instruments it is most probably very similar.

I am not the only one to think that, but as far as I know it has never been scientifically proven. A recorder is usually played for a while first by the teacher, otherwise it will be very difficult to find the correct intonation on it. Recorders are full of saliva, stringed instruments only have

Psychology of the bow

their natural moisture, but the vibrations they produce when you make music are very similar.

A very new bow plays a bit clumsily and the sound is a bit uptight. I try to replicate the old master bows by using very old wood. That helps, but it's certainly not enough. 100 or 200 years of playing and the continuous changes of light and moisture in the air make a difference between old and new bows. This can't be replicated.

The next thing is to find a good musician who I know well and let him or her play the bow for me. Their comments are very informative to me, but even more important is what I hear and what I see when the bow is played. Sometimes I ask questions, sometimes I know right away what could be improved. Sometimes the bow does not have enough grip at the tip. I have learned a little trick for that by studying the bows of FX. He often took a little bit of wood off the stick right behind the tip. A tenth of a millimeter can make a huge difference in the grip over the whole bow. I have impressed many string players by doing that, and to be honest, I can hardly believe it myself, but it works. When a bow is finished, I fall into a post-natal depression. To overcome it I do little repairs which are waiting to be done, until a new concept for another bow appears to me.

To sell a bow is not a problem for me. If I can make a musician happy and earn some money at the same time, my life is good. (must be Jewish) And when the day comes for me to go, my bows will survive me, that is also a comforting thought.

An instrument is often seen as a partner. There will be some struggles, sometimes they split up, but it is a kind of marriage. If the instrument is your partner, the bow is a part of yourself. That's the way it should feel. Choosing a bow is a bit like Harry Potter who had to choose a magic wand. The character of the magic wand must fit the magician, otherwise it doesn't work.

If I look at the bow of a musician, I can already tell a couple of things about him or her and about how they play. I see it by the hair, how many there are left, if there is a lot of rosin on them, if the stick is very dirty or if the leather is very worn. These are signs of how tight somebody holds the stick while playing and with how much vertical pressure they play with. If the bow is very clean, usually the musicians are very orderly too. Very emotional players often bring in a bow in bad condition, full of rosin and worn out, that doesn't mean they are no good, but they are the types who often show up late to their appointments.

In psychology a bow is clearly a phallus symbol, that seems quite evident to me. But what does that say about me as a bowmaker, I am not so sure. What I really enjoy is making new bows. Does that mean that I am not satisfied with myself? Well, I think that's not the case, I am very happy with myself. But a certain egocentricity I can't deny. You can call it introspection if you want to be nice.

Otherwise, bows and bow making have nothing to do with sex. Maybe a certain eroticism radiates from a good bow. I see beauty, character and flowing lines. When a certain light shines on the wood it starts to glow and becomes alive. I enjoy that very much. Maybe this is a *déformation*

professionelle. Somebody who has nothing to do with bows would probably be less impressed.

When a musician gives me his or her bow to rehair, they do that often with a little hesitation. They have a look that seems to say: Be nice to my bow, treat it well, it is mine. When I take it and open it to have a look at the mortise, the musician watches me with a little embarrassment, as if I was peeking in their underwear. Well, bow making is perhaps a bit like playing doctor. Isn't it a nice profession?

Understanding the materials

Our neighbor in Italy, Lucia, is a professional cook. Once when she went to a congress, I asked her if she expects to learn new recipes. She looked at me as if I had said something very stupid and told me: "Of course not, everybody has his own recipes, we get some knowledge about the materials we use". In fact, with bow making it is the same. It is fundamental to know as much as possible about the materials we use and we use a lot of different materials.

Types of wood:

- Pernambuco, ironwood and snakewood for the stick
- Ebony for the frog and button
- Lime-tree or similar for the plugs

Types of metals:

- Silver, gold and nickel on the frog and the button
- Brass for the eyelet
- Steel or iron for the screw

Others:

- Different sorts of mother-of-pearl
- Ivory, bone and synthetic imitation for the head-plate
- Tortoise shell, whalebone and silk for the winding
- Horsehair
- Colophony
- Shellac
- Propolis and beeswax
- Different sorts of leather

After more than 30 years in this business I have learned to how to use all of these different materials. But there are still a lot of things I don't know. For example: what happens exactly with silver when I am soldering? Why does it first turn white and then red? Or what is the chemical composition of shellac and why does it stick to the wood? Well, knowledge of materials is endless, the more you know the more you realize that you don't know much.

On the other hand, I think I do know more than what I can describe in this book, but I can't write down everything. Though, it wouldn't be wrong if I tell you a bit more about pernambuco. The Latin name of pernambuco or Pau Brazil is *Caesalpinia Echinata*. Pernambuco is a city in Brazil and happened to be the harbor from where it was shipped to Portugal. It is heavier and more elastic than most European woods.

To get to know a stick of pernambuco the first test I do is to cut off a piece and throw it in water. If it sinks it has a high specific weight, if it floats it is on the light side. It could still be usable, but I prefer the heavy wood. It has cost me many years to understand that I must use heavy wood to make a heavy bow and light wood to make a light bow. Sounds obvious, but it takes many years to understand and respect the character of the wood.

The following test is just as important, it is about elasticity. I have a little machine for that, my first teacher, maestro Lucchi, developed it.



LUCCHI METER

This device sends a high frequency through the stick and measures the time the frequency needs to get from one end to the other. The faster it gets through, the higher is the elasticity of the wood. This device, which I call the Lucchi meter, is nowadays used by most bowmakers and pernambuco dealers. A stick with a high Lucchi reading sells for much more than a low one. The numbers go from 4000 to 6000 Lucchi's. A stick with 6000 costs 10 times as much as one with 4000. Everybody thinks the higher the better. That is not my opinion. If you measure an old master bow, which every musician has agreed is a great bow, it is often not more than 5000 Lucchi's.

On the other hand, the Lucchi meter is not wrong, but one must interpret the reading correctly. To give an example: A stick with a high Lucchi reading is likely quite stiff and reacts very well to high frequencies, but on the lower strings it might sound hollow and dry.

How high the Lucchi reading of a stick is, depends on the length of the wood fibers. Long fibers are good for a high Lucchi number, short fibers for a low one. One might conclude long fibers are better. This can be true if you look for a bow with maximum stiffness and a fast reaction.

Carbon fiber provides that fully, but is carbon fiber better than wood? There are not many string players who would agree. The better carbon fiber bows work very well technically but they never sound very attractive. A beautiful sound is obtained by a stick which has more dampening and somewhat lower Lucchi numbers.

A beautiful looking stick from flamed wood usually does not have a very high Lucchi number. The flames in the wood are fibers which lay in different directions. They go in and out of the stick and break the light in a different way, dependent on their angle. These fibers are shorter and give more dampening to the sound. Even little knots are good for the sound in my opinion. It is in fact the irregularity of the wood which makes it so precious. No synthetic material can replicate that.

The next thing I am looking at is the direction of the year rings. You can see them best when you look at the tip from the front side. The way they lay in the head has a great influence on the fragility of the tip. Wood breaks the easiest in a right angle to the year rings. You can see that clearly looking at a trunk that is cut. All cracks point to the middle of the trunk in a right angle to the year rings. If you ever have cut wood for the fireplace you would have certainly noticed that. The safest method is to use sticks which are quarter cut. In that case the year rings lie horizontally in the bow head. With a stick like that I can make a thin and elegant head and it won't break easily. Do I have a stick with slab cut, that means the year rings are standing vertically in the tip, then I have to make a bow with a thick, strong head, otherwise it will break off sooner or later. Unfortunately, I know that from experience.

I became specialized in repairing broken tips. Musicians with a broken bow usually come to my shop quite desperate. It makes me feel like I'm working in a funeral home. I speak

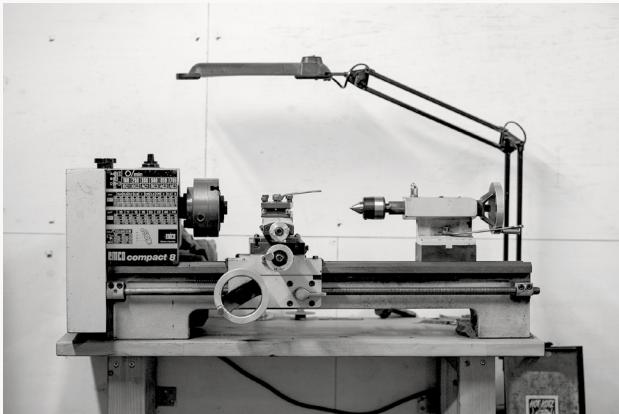
Tools

consolatory words and earn money with their loss. If the bow has split right through the head, it is relatively easy for me to repair. After the repair, the bow will play the same as it did before, but nobody can give a guarantee on this repair. The bow has no value anymore. If a stick breaks in the middle or shortly behind the head I can't repair it.

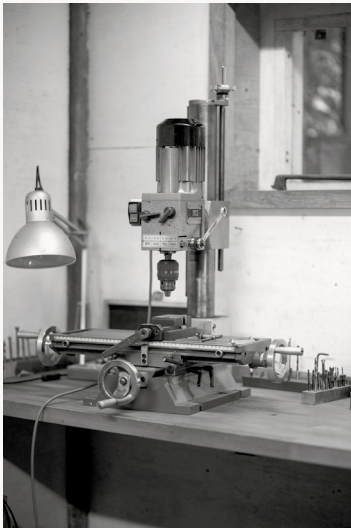


A BROKEN BOW

THE LATHE



DRILL AND MILLING MACHINE



My problem is that I don't really like machines. We don't have a dishwasher, nor a clothes dryer, even the espresso machine I have thrown out. We make filter coffee and we grind the coffee beans by hand. Crazy? Well, I am convinced that I am the only normal one and everybody else is crazy to love machines and automation. The lathe is indispensable to me for making the buttons. I am afraid that the buttons of other bowmakers look sleeker than mine. Some consolidation I can find looking at the buttons of FX. They are often crooked and oblique but still radiate beauty. It is something with the proportions that he does just right.

I recently changed my drill and milling machine after the old one destroyed an ebony frog. A screw came loose while I was milling, I was very upset. With the new machine I don't yet feel completely at home, but we're getting there. The machine is strongly built, more powerful and gives me more possibilities.

I am really fond of my shaving planes. The fat one on the picture below I have made myself. This one is good to dig in deeply. The ones made of brass are copies of old French models which were used by ancient French bowmakers. They weren't cheap, but they are very precise if the planing blades are thoroughly sharpened. And to be honest, I do not do it often enough. Every time I have finally sharpened them, I tell myself: Jesus, that is so much better,



SHAVING PLANES

why didn't I do that before? In Cremona I knew a violinmaker who sharpened all his knives every day before going home. That is maybe a bit overly compulsive, but certainly not wrong.

FAVORITE KNIFE



In fact, I have a whole workshop full of tools and wood, too much to describe them all. Only my favorite knife I must show you.

A German violinmaker has made it by hand, and I gave him a classical bow in exchange. He was very happy with the deal, while I was probably too generous. But I have been using this knife every day since and I still enjoy it.

PRIMITIVE
BOW



CLIP-IN
BOW



BAROQUE
BOW



CLASSICAL
BOW



MODERN
BOW



FRENCH BOW
(BASS)



GERMAN BOW
(BASS)



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Bibliography

Everything I have read and could remember I use in this book, but I have no ambition to give it a scientific coating.

Thanks

Of course, my family: Annette, Isa and David, Maarten van der Kamp for the pictures and my readers Erika Prins and Eric d'Ailly, Maaike Besseling for the nice lay-out, Pat Shak and James Campbell for editing the English version, but most important: I want to thank all the clients who play my bows.



On my website www.andreasgrutter.com you can find more information. There is also a film to see on how I make a cellobow for a young cellist.

If I meet someone new, I always look forward to saying that I am a bowmaker, because I know that they will find me a very interesting guy. That puts me in a comfortable position. Now I can even add that I have written a book about my life, the history of bow making, and the philosophy behind my craft.