6 The mechanics of playing the clarinet

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Introduction

I was given my first clarinet by my parents as a Christmas present, when I was nine years old. I remember taking it out of its case, and putting it together for the first time. The smell of the second-hand instrument was a particular delight – a sort of musty, oiled-wood smell, which went well with the sound I imagined it should have. We passed it around the family, everyone taking turns to try to get a tune out of it, and I was soon pleased to be able to do better than the others. It was mine, and I fell in love with it.

When I went to my very first teacher, Wilfred Kealey, he started to talk to me about music, and suggested ways of thinking which weren't directly related to the instrument, or even to the details of what I myself did. One thing which stuck in my mind was that I should imagine the clarinet sound as a smooth, round tube, which should begin deep inside me and stretch out through, and beyond, the bell of the instrument. It was my first encounter with a playing metaphor.

When we begin to play, we do think of the clarinet very much as an object – a very special object, perhaps, but nevertheless an object. It is an object that we must try to persuade to do what we want it to, and which often seems to resist us. So we are in the business of *doing* the right *something* to it in order to play well.

As we progress as players, though, our relationship with this object changes. We are more aware of the results we obtain than we are of the instrument itself. Our teachers, if they are as wise as mine was, will encourage us to start to think beyond the clarinet, and beyond ourselves, too, as we overcome the problems. They will try to have us be musicians who happen also to be clarinet players, perhaps by giving us metaphors like the one for clarinet sound I just described. In general, books about the clarinet do not talk about such metaphors a great deal, though presenting them is, I think, one of the major contributions that teachers make to their students. In a way, these

metaphors are the best we can do in the direction of describing the mechanics of that complicated system, clarinet plus player. I intend to explore them more fully in a later publication.

In this chapter I will use the 'tube of sound' as a sort of reference. It divides up naturally into a number of bits, beginning with the abdomen–diaphragm system, proceeding to the space inside the mouth and throat, then the embouchure and finally the physical instrument itself. I want to look at some aspects of each of these bits in turn. Because anything like a complete treatment would take up far too much space, I have tried to choose whenever possible a point of view a little out of the ordinary, in order not to duplicate the standard wisdom.

Although there seems to be a sequence, in the sense that the later bits wouldn't work without the earlier ones, it is a mistake to think that it is a sequence like an assembly line, in which some product undergoes independent processes at a number of different points and emerges complete at the end. When we play a note, all the bits are interacting with each other in a complicated way, so we shall need to remember that simply considering them in order may be misleading. This is particularly true when we talk about the sound of the clarinet.

Abdomen and diaphragm: support

We do not have direct physical experience of our diaphragm, the muscle particularly involved in respiration. Anatomists tell us this is because no sensory nerves run from the diaphragm to the brain, so we do not know when we are using it except by the things it does; the muscle itself cannot feel tired to us, for example. This fact can be a source of confusion to a player.

Some teachers add to this confusion by how they talk about the diaphragm. The central fact is that the diaphragm is a muscle that can only exert force downwards, to draw air into the lungs. It is of course pushed up by the abdominal muscles when we blow the instrument, and perhaps this is what teachers mean when they speak of 'playing from the diaphragm'. But this is not the same as using your diaphragm as a muscle in order to blow, which is a physical impossibility.

Because we cannot feel our diaphragm, there is an unexpected aspect of breathing and blowing that many players do not notice. A little thought is required to understand it fully, but it is so fundamental to excellent and flexible playing that the effort is worthwhile.

If I bend my arm, and then flex it like a body-builder showing off his muscles, I am flexing both of the opposing pair of muscles called the biceps and triceps. If I check that my arm is motionless, and I can feel that my biceps are flexed, I know that my triceps must be too. (The triceps are the ones on the back of the upper arm.) I would know this

even if I couldn't feel or see my triceps. But this is exactly the situation with the opposition abdomen–diaphragm. If my airway is open and no air is going in or out, and my abdominal muscles are flexed, I know that my diaphragm must also be flexed. Indeed, this is the only way I can know it! After all, the diaphragm is inside, so I can't see it, and I can't feel it directly, as we have said.

To play on top of this opposition is like bending and unbending my arm with both muscles flexed. Clearly we can do this, if the muscles are not unduly flexed. In other parts of our lives, too, we often find it an advantage to have both parts of a muscular opposition operating together – waiting for the serve at tennis or carefully colouring in a picture are contrasted examples.

The unusual part of the experience of playing on top of the abdomen–diaphragm opposition, and the one that I want to bring out, is that when you play in this way you can make a crescendo, and perhaps even more clearly, a diminuendo, without anything else at all happening in your experience. You imagine a diminuendo – hey presto, a diminuendo. You want a slower diminuendo? – no problem. I don't just mean that the process of doing it has become subconscious. When we drive a car, say, our actions are mostly automatic, though we can become aware of them by paying attention. No, here I mean that you can't call up *any* physical experience corresponding to the change in dynamic. It all stays the same. Perhaps your mouth shape or your embouchure may alter subtly to control the intonation. But the effort of the abdominal muscles remains constant, even as we reach the silence at the end of a long diminuendo. (If you find this difficult to achieve, try blowing more strongly as you get quieter.)

The explanation, of course, is that the diaphragm is resisting the abdominal muscles (which remain at constant tension) to a varying degree. But that is inaccessible to experience. So our only feedback is to listen to the result, and thus we establish a direct link with our own sound.

This explains how passage-work becomes even by itself, if we listen to it, how we can show shorter phrases without interfering with the longer lines, or interject a sudden *sforzando*, and why we can play fast dotted rhythms seemingly without effort. Our diaphragm learns what it needs to do by itself, if we *support* – and here's the magic word! People use this word differently. Doesn't it help to know it means the exact opposite of blowing? Or rather that it is an opposition or complement to blowing – part of a magic technique that works without conscious intervention? Isn't that wonderful?

It is important not to overdo support – it can lead to tense playing. (Imagine going through daily life with your muscles flexed like a body-builder!) Sometimes we play almost entirely without support. This often has a light quality in low dynamics, suitable for short, floaty

phrases, and a grand, gestural quality when loud. We have to do what is appropriate to the music.

Something to try: in medium-speed articulation (like Beethoven's Fifth Symphony: repeated *pianissimo* A's in the clarinet register) – where it is often difficult to guarantee an even response – support, and then ask your diaphragm to help! The quality of this 'request' is important. I don't mean you actually do anything – in fact, the opposite. Imagine writing your request on a small piece of paper and swallowing it! The idea is to give up trying to control it, and simply to listen.

Mouth and tongue – sound and nuance

One of the consequences of thinking of the sound of the clarinet as a smooth tube passing down the instrument may be that we are led always to associate a strong sound with a strong flow of air. This association, whilst useful in some ways, can create problems. We can begin to want the experience of pushing lots of air through the instrument in loud passages, and perhaps start to use reeds that are too stiff. A more useful metaphor is to think of the tube of air vibrating rather like the string on a cello.

The fact is that the sound of the instrument is made by the vibrations of the air column; and the air is already inside the instrument – we don't have to put it there. Some extra air obviously does pass down the instrument, but this is incidental. If the reed's motion were to be driven by some other means than blowing, we would still obtain a sound from the tube.

If we think about the matter in this way, we can see that we may indeed on some occasions be putting more air down the instrument than we need. It is not always the case that a large quantity of air is necessary to produce the most powerful, effective or resonant sound. It *is* required to have the most efficient coupling possible between the reed and the air-tube, and to allow the instrument and the reed to vibrate together. To succeed in this requires that there is sufficient air pressure to set the reed vibrating, and will also certainly have to do with precise details of the embouchure. The idea of the delicate control of a freely vibrating object (the reed), already co-operating with the resonance of the vibrating air inside the instrument, is a pleasing one, and it is also a mental image almost guaranteed to have the effect of avoiding an unduly tight or restrictive embouchure.

The shape of the inside of our mouth is not often thought of as having a strong effect on the sound of the clarinet. But though pressure waves inside the mouth are not audible in themselves, they clearly have some effect on how the reed behaves, just like the waves in the instrument, and therefore they indirectly make a contribution to the

sound of the clarinet. Strong evidence in this direction is that in special circumstances we can completely change the 'normal' behaviour of the clarinet: simply by altering the position of the tongue we can glissando down from the one-thumb plus register key *c‴* through a sixth or more. Mouth shapes control intonation in other parts of the instrument too, provided the reed is sufficiently responsive.

We have available already a highly developed vocabulary for characterising different mouth shapes: the vowels we use in speech, and the different tones of voice, including whispering, with which we habitually characterise it. Experimenting with these different vowels, it will be found, actually does yield a subtle variation in sound quality on the instrument. Looked at in this way, the 'traditional' instruction to open the throat may add up to nothing more than the instruction not to whisper. This is of course fine unless 'whispering' is what is musically called for; which, one has to say, it quite often is. (Try it!)

Consider further the analogy with speech. We habitually place a tremendous variety of delicate emphases on the syllables of the words we utter. On the other hand, much of the traditional study of an instrument is devoted to the discipline of producing a consistently even sound in all registers, and between notes. Now, whilst it is true that a variation in something can be meaningful only in the context of it being possible for that something to remain unchanged, we seldom need to play passages completely evenly, just as we very seldom speak completely evenly. One of the characteristics of excellent playing is that the player has control of the microstructure of the variation in timbre or dynamic between notes. This control is what makes evident the organisation of the notes into groups. It may not be perceived directly by the listener, who may simply think of it as 'good rhythm', 'brilliance' or 'eloquence' even in a running passage that seems even.

For example, a part of what is required to play the second movement of Stravinsky's *Three Pieces for Clarinet* is to make the first semiquaver passage both phrased as marked (by the slurs) and grouped as marked (by the beaming, in threes). To do this naturally is made a little awkward by the leaps involved, but even in the easy bits it can be elusive to show the threes without labouring the point. It is clear that we must show them, too, because a little later some of the notes recur in a different grouping, and an audible difference between the two structures must therefore be intended.

But almost any semiquaver passage needs to be structured in some way. Notes are not all of equal importance, and although it is a matter for a performer to determine on any particular occasion exactly where what we might call the resonances of the passage need to fall, some such hierarchy is always established. When we have established it, we might say that we understand the passage better.

What we want is the general ability to group the notes in the same natural way that we group syllables into words in speech; which is to say, not obviously but nevertheless intelligibly. A good move may well be to think of some words that we can imagine go with the passage, and check that our playing has the same character. This trick has a long pedigree, and I for one would like to see and hear it more used. When it is successful, it puts us in a much better position to articulate whatever understanding of a passage we may possess.

Of course, the clarinet differs from the spoken voice: it may 'fight back' when we want it to do something. A note that we want to be resonant for musical reasons may, on the instrument, be one of the weakest; and the opposite also occurs, perhaps to our even greater discomfiture. But as I said earlier, we are not dealing just with a clarinet. We ourselves are a part of the system, clarinet plus player, and we can learn to overcome the difficulty – even when we play on period instruments, which have more uneven scales. Sometimes, of course, we are fortunate here, and can use the 'deficiency' of the instrument to expressive effect.

The following simple exercise (Fig. 6.1) helps us in the direction of being able to emulate on the instrument the ability we have, when we speak, unconsciously to control dynamic and timbral variation. The idea is that the exercise is a sort of template that we use to create our own studies from the piece of music we are playing. There are actually two exercises of which I have shown only one, but how to construct the other will become obvious, and doing so is left to the reader. There is no conventional staff, because the three notes are intended to be *any* three notes, in ascending order. Neither is there a tempo indication, because we want to be able to use it in an intelligent way, at varying tempi according to our needs. Semiquaver equals semiquaver throughout.

To apply the exercise, we choose three consecutive notes of the passage and put them in ascending order. We may choose these three notes because they have different responses, or because one or more of them needs to be stressed, or simply because they feel or sound awkward as we play them.

As we perform the exercise, we listen with the intention of having the result be both even and modulated. (If we use the trick of using words to help us imagine this, we may come up with something rather like *millimetre–millimetre–millimetre–millimetre–metronome–metronome–metronome–micro–* repeated over and over again. You are encouraged to write your own libretto!) The important point is to achieve an equilibrium between the long legato and the substructure, a relationship rather like that of waves to a calmish sea. Notice that in the passage the first and third notes each get their turn to be the most

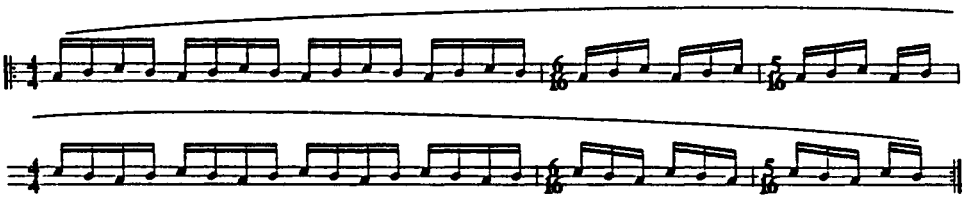

Figure 6.1 Exercise for the control of dynamic and timbral variation

resonant or loudest, so we will need, as I said, to invent an analogous exercise that gives a chance to the second note.

Usually the complete passage we are studying will require only one of the various organisations of the three notes that these exercises create. In my view, though, it is almost always a good principle to study, in addition to what we ultimately want to achieve, the alternatives that lie close by. In this way the exercise has its own life, and the original passage does not seem stale when we return to it.

As we experiment, it should become apparent that there are at least two things that can change to show the substructure, these being timbre and dynamic.

The control of the first is best thought of as done by a change of resonance – I often like to imagine that prominent notes have the quality of being played on a marimbaphone, and the others on a xylophone. Doubtless we obtain such effects by making almost imperceptible movements of the mouth and tongue. The details of this are best left to be trained by our ear as in speech, especially since we want the process ultimately to be subconscious; though it is worth experimenting with the effect of making mouth shapes corresponding to different vowels to begin with. Sometimes strange vowels have strange effects (like multiphonics) – but trying new things out always tends to expand our range of possibilities.

The control of dynamic occurs via the technique of support we mentioned earlier. As before, this works best when allowed to occur.

What we are learning is to play unevenly, but in the way we want. The slightly tricky rhythm of the exercise is intentional; while what Timothy Gallwey calls 'Self One' is coping with this, we can learn the really complicated stuff despite ourselves. (See *The Inner Game of Tennis* (New York, 1974), which one top-flight violin soloist calls 'the best book about violin playing I know'. It's pretty good for clarinet players too!) There is also an important effect when we return to the passage itself. We experience a release into a less demanding environment. Exercises we create for ourselves should always have this quality

of being both simpler and more complex than the passage they are designed to improve.

It is worth adding that as we play the exercise (or the passage) faster, we will do better if we are modulating a brighter basic timbre. This is because faster music needs a sound with more higher frequencies in it to sound as clear as slower music, for a given acoustic. Lower frequencies persist longer, and muddy the change from one note to the next unless the higher partials, which die faster, form a non-overlapping sequence. This is also why we find we need softer reeds in a very resonant acoustic.

Tongue – articulation

The most obvious use of the tongue is for articulation. Many players find this a difficulty and for a few it is a major obstacle. For some players at least, the problem lies in how they think about the actual physical technique of playing staccato. I want to investigate briefly the idea that by thinking about staccato in a different way we may begin to resolve the problem.

The verb 'to tongue' is a stumbling-block. This is because in common usage it can be applied to a single note (as in, 'that note is tongued'), and it carries the implication that it is something that we *do* with the tongue to begin that note. Moreover, it is sometimes suggested that the harder we tongue, the louder will be the beginning. In fact, the tongue begins the note only in the same sense that the light-switch lights the room. We do not get more light if we push it harder! Many people, though, start off by making this sort of mistake on the clarinet.

A better English word for our purposes is 'articulation'. This word is suggestive of both separating and joining. For example, we speak of the elbow as an 'articulated' joint, and use the phrase 'articulated lorry'. The word also applies naturally to a group of notes, indicating that those notes are to be separated to a greater or lesser degree whilst nevertheless remaining a group. We can say, 'this group of semiquavers is to be articulated', meaning, 'what we have to do is separate these joined-up notes'. If we imagine a series of notes that we want to be staccato, or articulated, we may think of them as represented in the diagram (Fig. 6.2).

This is a very schematic representation. The idea is that the shaded rectangles represent the sound of the semiquavers above them. The letters underneath are the usual vocalisations, with the letter *d* occurring where the tongue is on the reed and the letter *u* where it comes off, allowing the reed to vibrate.

In the conventional vocal representation of staccato, we are often asked to say the syllables *du-du-du-du-du* etc. Looking at the middle of

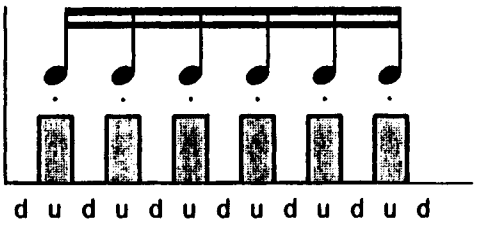

Figure 6.2 Schematic representation of articulation

the passage, though, there is no particular reason to group the *d* and the *u* in this way. We can just as well say the syllables *ud-ud-ud-ud-ud*, or, as I would suggest, creating a real English word, *mud-ud-ud-ud-ud* etc. We can imagine ourselves continually interrupting the word 'mud'.

The advantage of this move is twofold. Firstly, it has the effect of emphasising the unity of the passage – there is just one word 'mud' to be interrupted. Secondly, it makes clear that each individual note begins with a pure sound, created by the air pressure. There is no percussive 'clonk' made by the tongue! We do not begin each note with the tongue – the note begins when we stop stopping it.

Now, the question immediately arises: how much force does it require to stop it? Taking this question as a sort of research project, we can begin to experience the process of articulation from a diametrically opposed viewpoint to that suggested by the word 'tonguing'. You do have to experience it though – thinking about it isn't enough! (Get your clarinet out!)

First we must be sure that we really are producing a good firm sound before proceeding. Then, if we play a low E, say, it is possible to place the tongue gently on the reed without stopping the sound. The pitch of the note becomes flatter, but the reed is able to continue to vibrate even though it has a 'passenger' to carry.

It is essential to continue blowing strongly throughout the process. Some people find this difficult to do, because their tongue action is already bound up with their blowing. For them, breaking this connection is perhaps the most powerful move they can make to improve their playing, quite apart from their staccato.

By contrast, and quite strikingly, in the upper register it is impossible to touch the reed at all without immediately stopping the note. The action of the tongue in the upper register needs to be extremely light to release the note cleanly, but our experiment shows that we definitely need not worry about it being too light.

Notice that this discovery, of a difference between low and high registers, is the result of an experiment that we could not have thought of making had we not been open to the idea that the job of the tongue in 'tonguing' may not be to start the note.

Now, to reinforce this approach, imagine we have a hi-fi gramophone with a powerful amplifier and speaker at our disposal. We have also a recording that includes a loud sustained passage, and our job is to produce a loud, clear, short sound (i.e. a staccato chord) from the equipment. How would we go about it?

For my younger readers, I should perhaps explain that a hi-fi gramophone is a device for playing music encoded on a black-vinyl disc. A spiral track runs from the circumference of the disc to near the centre. Superimposed on the track are tiny wiggles which are transmitted to a diamond stylus on a pickup arm, which follows the spiral slowly from the circumference to the centre as the disc revolves; the resultant wiggles of the stylus are translated by the pickup arm into a varying electric current. This varying current is then amplified and used to drive a loudspeaker, yielding a close approximation of the music which was used to create the wiggly spiral in the first place.

If we turn up the volume control on the amplifier we can lower the stylus of the pickup arm until it is just above the part of the rotating record that contains the loud passage. At this point we can delicately lower the stylus on to the record for an instant, thereby producing the loud, abrupt chord.

Notice that there is nothing in our action that corresponds to the abruptness or the energy of the result. The powerful component of the system is the amplifier, which is operating constantly at the same level. If we were to match the intended loudness with a similarly violent action with the pickup arm, we would most likely negate the result!

The same situation obtains when we play a loud short note on the clarinet. The power comes from the pressure of our air-column, which is what causes the note to begin as the tongue stops stopping it. Admittedly it does also seem that a violent action of the tongue is being performed when we hear a *fortissimo* staccato note on the clarinet. But as we have seen from our experiment, it takes very little contact with the tongue to stop the reed, even when it is vibrating strongly. So the helpful analogy is with a control system, rather than with a power system. You can play a very loud short note with a very delicate and precise tongue action, just as, in principle, you could turn on and off even an atomic power station with your little finger.

This order of discrepancy between input and output can profitably be imagined as we play. We really need practically no contact between tongue and reed in the high register. The area of contact can be reduced almost to nothing and the effect still achieved, even in *fortissimo*. Nor is it necessary to specify exactly how the tongue moves. I find that in the higher register I tend to touch the reed with the underside of the tip of my tongue, which seems to alter shape rather

than move bodily, especially in fast passages, whilst lower down the action is larger. (A student once said to me, 'But, my teacher says that's *wrong*!') Also the degree of tension in the tongue can vary. Perhaps those with a very fast staccato have succeeded in controlling the sort of oscillations that we sometimes get in flexed groups of muscles, though in general, in my experience, less rather than more tension is to be encouraged.

To conclude this very brief investigation of staccato, the following exercise may be useful. I said before that it is often advantageous to get one's attention out of the way to allow one's body to learn more fluently and naturally. If we concentrate on a difficulty other than that of articulating, our conscious minds cannot interfere.

One of the abilities we sometimes need when we play music is the ability to change between semiquavers and triplets, say, or between straight quavers and quintuplets, whilst the beat itself remains constant. This can be made into an exercise in staccato, using a metronome. We switch at random between groupings of two, three, four, five and even six to a beat, against a constant pulse. The mental difficulty of imagining the shift accurately and adjusting when we prove mistaken I have found to be an excellent context in which to develop basic articulation skills.

Embouchure

The famous French oboist Maurice Bourgue once said in a class, 'The real embouchure is in the stomach. The other is only a connection. You should take the reed as you take a forkful of food: simply.'

This is a wise remark, even on the clarinet. One of the reasons why the embouchure becomes so important to us is that we tend to give too much psychological weight to the idea of controlling the reed directly in order to produce a good basic sound. Notice that the behaviour of the reed is much less critical when we are playing what we might call 'good' notes. Here the external clarinet tube is a strong resonator, and the reed co-operates with it. So on any other notes we may well do better to try a simple embouchure to begin with and concentrate on giving the sound its warmth by choosing an appropriate mouth-resonance, opening the throat and so on. In my experience variations in the embouchure are mostly a contributory effect to nuances in the sound quality.

There are many different types of basic embouchure because there are many different types of mouthpiece, and it is evident that the strength of the reed also makes a difference. I think it is most useful to imagine the embouchure as controlling the reed by touching it almost exactly over the point where it leaves the mouthpiece facing. As we play louder or softer, the length of the part of the reed that

moves away from the mouthpiece tends to change. We must compensate with our embouchure if the pitch is not to be affected. (One of the advantages of practising long notes is to render this type of compensation automatic.) Moreover, the lower lip is capable of varying degrees of firmness in itself, as well as being able to exert pressure against the reed. This is important because although the primary function of the lip is to stabilise the position of the fixed point of the reed-pendulum for a given note, there is also a damping of the reed's vibration.

The effect of such damping is to remove the very high-frequency partials in the sound. We need to do this to a certain degree because above a certain frequency, called the cutoff frequency, the vibration of the reed is not coupled to the tube. (The high frequencies are not reflected at the open holes.) The presence of too much of the resulting high-frequency 'noise' gives rise to a harsh and unpleasant sound. An important function of the embouchure is to control this harshness. However, if the area over which the lip touches the reed extends substantially beyond the fixed point, then the frequency above which the partials are removed is lower; so we get a duller sound, and actually also a slightly lower pitch. Obviously, if the lower lip muscle is flexed, it has a smaller 'footprint' on the reed (compare the area of ground contact of a fully blown-up bicycle tyre with that of a 'flat'), and so the resultant sound is richer in upper partials. We also want to be able to allow the embouchure to vary slightly, so that the sound alters moment by moment to modulate a phrase. This is another reason for the lower lip to be flexed – in this state it is capable of changing subtly. (For very special effects, of course, the lower lip can be as relaxed as required.)

By the way, a particularly good way of ensuring that the lower lip is alive (by this I mean flexed, as opposed to behaving like a bit of dead meat covering the teeth) is to think of pushing down with the top lip on the top of the mouthpiece. The desired effect is instantly achieved. Perhaps this is why double lip embouchures are reputed to produce a better clarinet sound.

The fingers

It is often said that we should try to minimise finger movements. Having seen players failing to play accurately whilst moving their fingers a lot, most of us would tend to agree. I remember designing and making a gadget out of a coathanger to encourage myself to play with my fingers closer to the keys. A length of wire ran from the barrel of the instrument to the bell, about an inch-and-a-half above the holes. Whenever my fingers moved further than this distance from the keys, they struck the wire and brought the matter to my attention. I

recommended the system to my students, but found that I used it little myself.

I have since come to think that the instruction to minimise finger movement can be misguided. It is true that there are clarinettists of great ability who move their fingers only a small distance, but equally there are others just as fluent who use larger movements. Sometimes it seems as though the concentration on small finger actions in some way inhibits the expressivity of yet a third group – they may be able to play the passages, but somehow they seem to lack character, as though they are too distanced from what they are playing.

The problem is that the instruction is a negative one. Clearly, we want to avoid the desperate thrashing of fingers that we sometimes observe with inexpert players, but perhaps we can do better than the usual approach. I would like to recommend an alternative way of thinking about the situation that leads to our playing with small movements when it is really necessary, but allows us to use larger movements without deleterious effect when it is not.

If we play a one-octave ascending F major scale in the chalumeau register of the clarinet, first slowly and then quite substantially faster, a question we can ask, either of a student or of ourselves, is: supposing the second version of the scale to be, say, three times faster than the first, how many times faster do we have to move our fingers in order to play it?

Reflection shows that clearly nothing physical need move fast. All that is required is that each successive finger begin to move away from the corresponding key or hole sufficiently soon after its predecessor. In this situation, therefore, neither fast nor small finger movements are demanded. To put it technically, the high speed of the run is guaranteed if there is a high phase velocity associated with the finger movements. What is required is precision of movement. The movements themselves can be slow and large.

Of course, I have chosen an extreme case. Here, once a finger has moved it does not participate further in the run. Not all fast passages are like this, though I suspect that most players will be surprised by how large a proportion of any particular passage does turn out to be of this type. A trill is an example of the opposite extreme.

For me the important part of this is that it leads to a natural classification of the various parts of a passage of fast music as either requiring fast finger movements, or not. In general it is best to begin by regarding all of a passage as a candidate for slow finger movement, as it seems that faster movements occur more naturally in the context of slow movements than slow movements in the context of fast movements; and anyway we are likely to be erring in the opposite direction out of our natural response to the speed of the passage. We need not experience slow movement as a negative instruction if we think of it as

a 'relaxing' one. Perhaps the advantage of the instruction to move slowly over the instruction to move less is that the latter can result in greater tension. Also slower movements take longer to execute, even if the run itself is still fast. One of the noticeable characteristics of expert playing is the elegance of it; there seems to be more time available to a master player than we experience. To engage with our own mastery, we mostly need to create for ourselves the illusion that we have more time.

We should always try to isolate the parts of a passage that give us difficulty. One of the traps into which we can fall is that of generalisation; as when we say, 'this passage is difficult' when it would be more accurate to say, 'I find these three notes awkward', or even better, 'I tend to play an extra note between these two', or, finally, '*that* time, I played a rather flat G natural between the A and the F'. If we know the moments that require fast finger movement, we can practise them intelligently.

It is amusing and instructive to try playing the ascending F major scale, always with slower and slower fingers, faster and faster until the notes fly out at a dizzying speed! The experience is exhilarating. Be careful to keep the dynamic strong and the sound bright even though the fingers are much more relaxed. Try following it up with selected passages from Weber, who nearly always writes so that we can play, if we wish, really fast without major difficulty (except that of being heard clearly). The result is hardly musical, but it is an indication of how easy it can feel if we let it.

As always, we need to make some remarks about the subtleties that should still be available after we have made the initial move towards slow fingers. There are some circumstances where it is advantageous to move our fingers almost fast enough for the actual closing of a hole to be audible as a sound in its own right. 'Brilliant' passage-work sometimes has this quality. It can be helpful to regard a passage as having a structure consisting of smaller movements as sub-movements of larger ones, with the larger ones slower than the smaller. (Some passages around the break, as well as those using the thumb keys in the extreme low register of the larger clarinets, respond well to this approach.) Also, although we will mostly find ourselves making the most economical movement consistent with the execution of a passage, sometimes we will also find ourselves wanting to add further movement, even of the fingers, in order to be congruent with the other expressive characteristics of the music. Sometimes this sort of physical expression can become exaggerated, but it is unwise to react by reducing it to an absolute minimum. Almost all expressive players indulge in some degree of movement, though with the best this stops short of being a distraction to the audience and does not interfere with their ability to play.

The instrument – sound and intonation

The clarinet as an isolated instrument is theoretically deficient from an acoustical point of view. This came as a surprise to me when I found out about it, although perhaps I should have known from experience! The matter is a bit technical, but essentially it turns out that there is a trade-off between excellence of sound and excellence of intonation. If you design a clarinet to be well in tune between the registers, by fiddling with the bore, you necessarily make the instrument less resonant and responsive. Fiddling with the bore is necessary to make the instrument in tune partly because the clarinet overblows at the twelfth, and an equal-tempered twelfth is slightly different from a natural twelfth; but mostly because the register key or speaker key alters the pitches of the notes of the upper register to a varying degree, since it cannot be in the correct position for all of them simultaneously. On most clarinets it also has to double as a tonehole for the throat B♭. When the bore is altered the instrument is less a 'clarinet' (a cylindrical tube closed at one end). The sound is correspondingly less rich. Those who want a fuller story should read *Fundamentals of Musical Acoustics* by Arthur Benade (Dover Publications, 1990, revised and corrected edition). See also Chapter 2, pages 27–30.

The lesson to be learnt here is perhaps that we are wise not to be too demanding of the instrument itself in terms of its intonation. An instrument with a good sound is more flexible with regard to intonation anyway – we may need to bend notes, but they bend more easily and the sound remains acceptable.

One small technical fact about intonation that is not widely known is that we play sharper just after we have taken a breath than we do a few seconds later. This is because the air in our lungs becomes denser as the oxygen in it is replaced by carbon dioxide. The process happens quite quickly, but it is worth waiting a second or two after breathing in at the start of the slow movement of the Schubert Octet, for example. It doesn't feel natural, but then a sharp C doesn't sound natural either. For the same reason, it's best in a long passage to avoid breathing just before a sharpish note. (Breathe before a flat one!)

It would be nice to give some survey of the various solutions to the problem of making a good clarinet, but the subject is very large and a cursory treatment would be useless. It's worth saying that the advantages and disadvantages of the French clarinet compared to the German clarinet (both in their different ways excellent) are bound to become more central to performers' choices as orchestras become more European. The current interest in playing on period instruments has also given clarinettists more courage to experiment, and anyone who has played Brahms or Wagner on a German clarinet is not going to forget the experience even if mostly his or her work is on a French instrument.

But whatever instrument we play on, it will remain true that we as players are the most powerful influence on the results we obtain. I have tried to make it clear throughout this chapter that we do best to think beyond the technicalities and towards the music. In the end we as musicians are an inextricable part, and the most important part, of anything we might want to call the 'mechanics' of playing.