

Your finger and arm shouldn't act alone – their momentums add up

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HAVE YOU EVER?

Get tired playing loud? or playing fast? It's tempting to blame your slow fingers, or your seat height, or your practice method, or the instrument, or your 'bad arm-weight' technique... But such complaints are misguided. The solution is more simple. It's mechanical: ensure that you are **combining** the right amount of momentum from your finger, hand, forearm and arm into the key **at the moment of impact**.

Mechanically-speaking, your touch is a momentum generator, and your finger-tip represents the end point of a momentum chain. Using the wrong parts of the chain at the wrong time will be the source of your mechanical errors — eg, most commonly, like giving your fingers too much work to do without the support of some hand drop or forearm rotation.

FACT BOX

Momentum — mass times velocity — is what a moving body part delivers into the key to make sound, not its size or how hard it tries — or what poetic message you've blessed it with. When finger, hand, forearm and arm move together, in the same direction, at the same moment, their momentums add. Loosen any joint along the way and that "bridging" breaks — and the total momentum reaching the key is reduced. The 'give' in your joints during impact is such a loosening, which is why advocates of arm-weight methods can get away with dropping such overly-large amounts of weight into the key — the full momentum of the momentum chain is never actually delivered to the key.



Break one link in the chain, and the sum falls apart before it reaches the key. (Ch. 6, Optimizing Pianism)

"It is meaningless to talk about the impact of one object on another object without taking into account all three variables of the vector — its mass, its velocity and its direction."

— cited Ch. 6, *Optimizing Pianism*

THE MYTH

A heavy, relaxed "arm-weight" touch delivers more mass into the key, so it must produce a richer tone.

THE BUST

Besides being wrong on perceptual grounds — there's a whole chapter of my book there! — the full mass of the arm is almost never transmitted into the key — knuckles collapse, wrists sink, creating "partial bridging", which reduces the total amount of momentum going into the key, and, hence, its volume (and, hence, its accompanying sound quality).

SO...

DON'T believe that a big, relaxed arm motion automatically means a bigger sound, nor that a well-rounded, arched hand with a well-timed finger stroke and forearm drop into the key means any less sound. **DO** realise that it matters far more how the momentum components are connected during impact — the connections that make the sound loud or soft, or easy or hard to play.

There are many ways to produce the same sound. The secret is not in the finger nor the arm, but in the momentum combinations that are chosen BY YOU and their degree of partial bridging during the moment of touch. There'll be a best solution for every passage. Find it!

One step forward... one step ~~backward~~ forward...

Cameron

Concert Pianist. Pianism Scientist. PhD. Physician. Author.

Next issue: confirmation bias — why the evidence you choose to use has usually already agreed with you before you've checked it.

WANT MORE

Stop guessing about how much finger or arm to move – understanding how touch works and solve your problems yourself!

The Book

The full mechanics of mass, bridging and momentum transfer.

Read it ›

Free Info Sheet: 3M Self-Assessment

Find out if your Mechanical skills are quietly undercutting the other two Ms.

Start here ›

5-Sessions Intensive

Five 1:1 sessions across Musical, Mechanical, Mental, Process and Beliefs — momentum chains included.

Learn more ›

REF: Dounskaia, N. "Control of Human Limb Movements: The Leading Joint Hypothesis and Its Practical Applications." *Exercise and Sport Sciences Reviews* 38.4 (2010): 201–8. · Askenfelt, A. & Jansson, E.V. "From Touch to String Vibrations. II." *Journal of the Acoustical Society of America* 90.5 (1991): 2383–93.

ONE FOR THE ROAD

"A chain is only as strong as its weakest link."

— Traditional proverb

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