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The Hanging Hair Test (HHT)

Preface

A shaving edge needs to meet two well distinguished goals:

1. It has to sever human hair without much effort.
2. It has to be able to glide across human skin without doing any harm.

The former requirement can be probed with the aid of a human hair. This method is called the Hanging Hair Test, commonly abbreviated as «HHT».

Controversy?

The HHT has a long history of being dismissed as a «parlor trick», especially by people that experience nice shaves without being able to «pass» the test on the razor. They appear to look at the HHT as a binary «0 or 1» test and, getting «0» as result for edges that do shave, they disregard the whole HHT as being erratic. For putting the HHT into use while honing a razor, the above is a faulty assumption. Just like the other tests, such as the Thumb Nail Test and the Thumb Pad Test, the HHT is a probing test, much more than a True/False-type of test. Like these other tests, one needs to learn how to properly conduct a HHT and one needs to learn how to assess the results.

Before diving into the heart of the matter for turning the «trick» into a valuable method of measurement, we should realize that all the tests are merely an aid to guide us through a honing job. The scope of this article is to expand the arsenal of available methods for probing an edge. To use, or not to use, is a question of a personal nature.

The physics of a hair

A hair is not a monolithic object. It has an inner core and an outer structure. The outer hull of a hair, called the «cuticle layer», consists of overlapping keratin cells, that are arranged like shingles on a roof. Severing a hair while shaving, is forcing a steel wedge, formed by the razor's edge, between two adjacent shingles.

Another important physical property of a hair, is its hygroscopical behavior. Hair takes up humidity extremely well, causing the inner core to swell, effectively reducing the overlap between the shingle-like outer cells. Also the keratin itself becomes softer when hydrated. This is the part of the reason why we prepare our beards prior to shaving.

Calibrating the hair

It is best to harvest a small strand of freshly washed, very well rinsed hair. Trim to approximately 60mm (2.5") and store in a little container for future use. You might find it handy to mark the tip side of the hair. A small strand holds enough hairs to provide you with years of repeatable results. Since part of successfully using the HHT comes down to knowing how your particular source of hair responds in any

given situation, it's important to use an invariable source. This offers much more reliable results than pulling one out of a scalp or stealing a hair out of your wife's hair brush.

Standardization of the test

1. **Moisten the hair.** This avoid all possible variations in outcome, due to fluctuations in humidity of storage conditions. A good way to do this, is to wet the thumb and index finger, pinch the hair and drag it through. Allow the hair a few seconds to settle.
2. When performing the test, hold the hair **at the tip side** and slightly **angle the edge of the razor** away from you. This maximizes the possibility for the edge to catch between the cuticle shingles.
3. **Scale of possible results:**
 - HHT-0 - **shave**:The hair can be shaved immediately at the holding point. This is strictly spoken not a true HHT, but it does tell us that the edge is capable of shaving. *[all other attempts must be made at least half an inch from the holding point]*
 - HHT-1 - **violin** : The hair doesn't cut, but it "plays violin" with the edge. This is due to the shingles catching the edge, but it's not sharp enough to penetrate. On a full hollow razor, a faint ringing sound can be heard. On all razors it can be felt with the fingertips that hold the hair.
 - HHT-2 - **split**: When it is dragged across the edge, the edge catches the hair and splits it lengthwise.
 - HHT-3 - **catch&pop**: When it is dragged across the edge a bit, the edge catches the hair and pops it. The severed part will jump away.
 - HHT-4 - **pop**: The hair is popped immediately when it touches the edge. It still jumps away.
 - HHT-5 - **silent slicer**: The hair falls silently as soon as it touches the edge.

Markers for using the «hanging hair» probing test

Serrated versus smooth edges

Edges that carry a microscopic sawtooth pattern have a performance advantage for severing hairs. Unfortunately such edges also have an advantage for blemishing skin, while used for the purpose of shaving. Per consequence, we aim for smooth, toothless edges while honing a razor. However, during the early stages of razor sharpening, sawtooth patterns are present at the edge, and this has a big influence on the performance of the HHT. On a sawtooth edge, only a limited number of minuscule spear-like points try to penetrate the hair. Those points, when freshly cut on a relatively coarse hone, have a high chance of being quite acute. More acute than the overall keenness of the entire edge. In addition to that, the entire weight of the hair is pushing down on only a few teeth, instead of being distributed evenly. Both principles make the serrated edge a very effective one. Even an edge coming off a DMT 325 can pop hairs surprisingly well. Serrated edges do not show all the fine nuances from the aforementioned scale. The hair tends to pop or not.

Use of the HHT during the bevel formation stage

In light of the previous paragraph, we can use the HHT for knowing what to aim for while setting a razor's bevel on hones that leave (micro) serrations at the edge. Most hones in the 1K region and below leave an edge that performs according to HHT-3, when the edge meets its limit on the hone. At this level, there is not much gradation to be expected. The edge simply grabs the hair and pops it, or it doesn't. When bevel work is done on hones that don't deliver a micro sawtooth pattern, such as the Belgian Coticule, no other HHT-activity must be expected, other than HHT-0. In the absence of teeth this is fine.

The violin (HHT-1) or the hair splitter (HHT-2) are even better.

Use of the HHT during the edge refinement stages

After a flat and complete bevel is reached, the edge needs to be perfected on one or more hones that are capable of making the edge keener and replacing the initial sawtooth pattern with a finer one. This is typically done on synthetic water hones in the 2K-10K region or on natural hones with fine and ultra fine abrasive quality.

It is during this stage that we will initially loose the crude "sawtooth popping" of the bevel stage and get more distinct HHT-results. On each next hone, the razor will usually fall back 1 or 2 points and start working to its limit on the new hone. This happens, because how finer the sawtooth pattern, how keener the edge needs to be for the same cutting performance. With good "fingerspitzengefühl" on the TPT these principles can be observed just the same.

It is impossible to set exact markers for HHT-goals to be reached on hone "X" or hone "Y". It depends a bit on the attributes of the hair and moreover on the skills of the honer. Not all athletes jump equally far when wearing the same shoes. The most important thing is that you learn, from your own experiences and observations, what to aim for on which hones of your honing progression. At the end of this article you'll find a list of typical HHT-scores for a few well-known hones, but these numbers must certainly be read as very crude pointers.

Use of the HHT during the finishing stage

Most dedicated finishers aim to create the smoothest possible, toothless edge. If the edge of the razor was still pretty toothed after the last refining hone, we can expect a clear fall back of the HHT-score. In a way of speaking, the finisher is revealing the true keenness of the edge it smoothes out. Most finishers are too slow to regain that neglected sharpness, hence it is imperative to aim for ample sharpness if you wish to finish on a very smooth hone.

Harshness/smoothness, indulgence/unforgiveness and final keenness are all edge qualities that are highly tangled up and interconnected at this level of sharpening a razor. It is a widely spread misconception that how higher the HHT-score, how better the edge. It is far more important to know what to expect from a particular finishing hone, than it is to merely aim for the highest score without any discern. Probing with the HHT has much more to do with answering the question "Does my edge meet certain expectations?" than it should be a carrot in front a honing donkey.

Use of the HHT during the first stropping session

One of the least recognized parts of sharpening razors is the key role of the very first stropping session. The boundaries of an edge's sharpness after the last hone are literally defined by an extremely narrow strip of erratic steel at the very bevel tip. On well-honed razors, this strip has a typical width of approximately 0,5 micron and below.

There is almost no scientific research done on how stropping affects this narrow strip of steel, but that something is going on can be readily deduced from the observation that stropping on clean leather delivers a manifest improvement of the edge's ability to sever a hair. Part of that obvious performance gain is lost by the end of a shave, hence the need to re-strop before each shave. Still, not all of the initial performance gain gets lost.

Stropping experiments after different types of finishing hones have revealed a correlation between the improvement to be expected from stropping and the finishing hone itself. Some finishing hones promise a greater margin for edge enhancement on the strop than others. Also the razor itself influences the process,

probably due to alloy and temper of the steel.

Taking all this into account, one can generally expect a step up of 1 to 2 points on the HHT score (depending on the finishing hone) after a prosperous first stropping. It is good practice to start with 50-60 laps on clean leather. If this doesn't meet the expectations, the same amount on unpasted linen followed by leather offers good perspective of getting the edge in line. If also that doesn't deliver the aspired improvement, one can try 5 to 10 laps on a flat paddle strop loaded with Chromium Oxide, followed by clean leather once more. In absence of success with that last resort, one needs to critically reexamine the honing and perhaps also his stropping skills.

An illustrative table

To illustrate that the above paragraphs offer more than a mere theoretical elaboration on the HHT, the following table gives the author's personal expectations for the performance score of a number of hones. I would like to encourage all to expand this list with further empirical data, even if it diverts from present figures.

Bevel formation

- * DMT-C (325grit): HHT-3, without prior nuances
- * DMT-F (600grit): HHT-3, without prior nuances

Bevel correction

- * DMT-E (1200grit): HHT-3, without prior nuances
- * Coticule with slurry: typically HHT-O or HHT1, depending on specimen

Edge refinement

- * Coticule with diluting slurry: edge steps up from HHT-O to HHT-3, at best, difficult to predict
- * BBW with light slurry: after DMT-E, edge initially drops to HHT-O and steps up to HHT-2, HHT-3 at best.
- * Naniwa Chosera 5K: After DMT-E, edge initially drops to HHT-1 and steps up to HHT-2 at best.
- * Naniwa Chosera 10K: Edge steps up to HHT-3 or HHT-4
- * Nakayama with slurry: Edge steps up to HHT-3 or HHT-4

Edge finishing

- * Naniwa Chosera 10K: edge steps up to HHT-3 or HHT-4, after stropping always HHT-5
- * Nakayama with water: edge steps up to HHT-3 or HHT-4, after stropping: +1
- * Coticule with water: edge steps up (or drops) to HHT-3, after stropping: +2