Formula Masking #1

A Review of General Masking Concepts and the Masking Plateau
Overview

- Mastery of plateau masking is important
- Sometimes you cannot plateau
  - Speech discrimin testing
  - ABR testing
- Sometimes it is more efficient to formula masking
  - Time savings in any busy practice
  - Limited test time (children)
- Sometimes you will want to revert to plateau masking if at all possible
  - Too many unknowns, too complicated, too great a chance for errors. (Conductive loss bilat or to NTE)
All crossover happens by bone conduction, even if the stimuli are presented by air conduction.
Interaural Attenuation is...

- The loss of sound intensity as it goes from one ear to the NTE **COCHLEA**.
- Depends upon:
  - Frequency
  - Transducer
  - Individual skull characteristics
    - Since we don’t know who has a “thick skull” we assume the worst case scenario. Assume minimal IA.
40 is the commonly used minimum IA value for TDH/MX41AR

- It is probably a bit conservative. 45 is probably appropriate, with a median IA of 60. However, tradition dictates using 40.
- Deeply inserted insert phones give 15-20 more IA.

Viewing the next two figures, what minimum IA value will you use?
Minimum Values, per Sklare & Denenberg, 1987

Comparison of Interaural Attenuation Values

Minimum Values, per Sklare & Denenberg, 1987
Min. IA Munro & Agnew (1999)

Frequency
IA Minimums
Supra-aural
Insert - deep
Insert - shallow
FIGURE 6.3 Average and range of interaural attenuation values obtained on six subjects using two earphones: TDH-39 encased in MX-41/AR supra-aural cushion (●) and ER-3A insert earphone with deeply inserted foam eartip (■). (From Killion MC, Wilber LA, Gudmundsen Gl. [1985] Insert earphones for more interaural attenuation. Hearing Instruments. 36, 34. Copyright © 1985. Hearing Instruments is a copyrighted publication of Advanstar Communications Inc. All rights reserved. Reprinted by permission of the publisher.)
From the EARTone manual
Opinions vary

What do you plan to do?

- Mask whenever 40/50 rules met
- Use Yacullo’s rule: 50 in high freq, 75 at 1k and below
- Have a frequency-specific chart of IA values per transducer

Pros
Cons
Speech & click IA

- When testing with a wide-band signal (speech, click) some say use the same minimum IA – you don’t know which frequency is crossing over & heard. However, clicks and speech are wide-band signals, meaning less energy at any single frequency region, and appear to have greater IAs. Supraaural earphones, 50 is a good minimum number; 60 for inserts. You can be more conservative if desired.
Next big point – Occlusion Effect

- BONE CONDUCTED sound is enhanced when the NTE is covered.
  - The three mechanisms for BC are:
    - Compression / distortion of cochlea shell
    - Inertial lag of stapes in oval window
    - BONE CONDUCTION BY AIR CONDUCTION
Covering NTE enhances the BC signal
So… don’t cover NTE unless you are going to mask

- If you put oscillator on the left ear, and an insert in the right ear, the “unmasked” threshold (dotted line in illustration) is artificially lowered by the amount of the occlusion effect for that person/ear. Bone will be better than it would be without masking.

  e.g. Right ear is NTE and has normal hearing. The occluded, unmasked threshold is RE w/ OE.
If you record an unmasked symbol, it is inappropriate to have used contralateral occlusion... you are not communicating the results in a way that lends itself to replication of findings.
My bad!

- 84 year old male. Tymps normal. Reflexes present probe right, ipsi & contra, but I couldn’t get a seal on very elliptical ear canals left side.
- Tested the patient w/o a student.
1\textsuperscript{st} patient of the day. What’s wrong with this picture?

Obviously my brain was on holiday before my body; what is my mistake?

Masking levels: 60 / 70 / 60 / 60 / 70 at 250-4k respectively.
• Too bad I couldn’t get reflexes on the left ear!

• Anything else occlusion effect wise that could help us figure out if left really has a conductive loss?

Masking levels 75/70/60/60/70
Another note on occlusion

If there is a conductive loss in the NTE, then the extra AC by BC is not likely to help hearing – the sound from the “BC by AC mechanism” is attenuated by the conductive loss; the other BC mechanisms predominate. If there is a outer ear conductive, eg plug of wax, then you might already have an OE.
When you start plateau masking for AC, you don’t start with the noise right at threshold, you start at 10 (?) above, right?

And for bone, you start at the OE plus this pad

The rule “Bone 25/25/20” comes from OE (15/10) + pad (10)
Technically… you can omit OE

- If you know that the ear has a conductive loss (e.g. flat tymps and absent reflexes bilaterally), you could omit the occlusion effect from the formula you use for masking.
What if there is a small air-bone gap were at just one frequency, would you not add the OE just at that one frequency?

- Probably should use OE even at that one frequency. It’s likely a “fluke” that there is an ABG, so be conservative and add OE in.

- *(More to come. In formula masking, you’ll hear that you add into the calculation ‘the larger of OE or ABG’ which I only mention here so that when you study for the test this slide doesn’t confuse you.)*
Masking Assignment One

- Measure a friend’s hearing
  - Forehead bone unmasked:
    - 250 – 4k Hz. Use forehead symbol
  - Better ear (if there is one) bone unoccluded:
    - 250 – 4k Hz. Typical symbol.
  - Same ear bone with NTE occlusion with insert earphone.
    - Retest, mark > 0
  - Each ear air conduction unmasked
  - Do not stop at zero, establish threshold in the negative # range
Record using table below & submit with your name & initials of your “subject”

<table>
<thead>
<tr>
<th></th>
<th>250</th>
<th>500</th>
<th>1k</th>
<th>2k</th>
<th>4k</th>
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<tr>
<td>Forehead</td>
<td></td>
<td></td>
<td></td>
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<td>UnOcc</td>
<td></td>
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<td></td>
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<tr>
<td>NTE Occ</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Right Air</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Left Air</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

Remember – go below zero with thresholds!
### VT threshold limits

<table>
<thead>
<tr>
<th></th>
<th>250</th>
<th>500</th>
<th>1k</th>
<th>2k</th>
<th>4k</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastoid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fingers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ankle bone - medial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
We will examine

- How much shift came from occluding?
- Is forehead equal to mastoid?
- Are we seeing “routine” air bone gaps?
- What is a low end & a realistic VT threshold?
- Ankle bone – exploratory; test of peripheral neuropathy
### Table 2  Vibration perception and body sway in normal controls and patients with polyneuropathy

<table>
<thead>
<tr>
<th></th>
<th>Normal controls (n = 32)</th>
<th>Patients (n = 25)</th>
<th>Significance</th>
<th>Z Value</th>
<th>p Value</th>
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</thead>
<tbody>
<tr>
<td>Neurothesiometer (V):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right ankle</td>
<td>12.5 (9.2)</td>
<td>30.8 (16.0)</td>
<td>4.2</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Left ankle</td>
<td>12.8 (9.0)</td>
<td>28.5 (16.1)</td>
<td>3.7</td>
<td>&lt; 0.001</td>
<td></td>
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<tr>
<td>Right tibia</td>
<td>14.4 (8.2)</td>
<td>27.8 (15.7)</td>
<td>3.5</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Left tibia</td>
<td>13.8 (8.4)</td>
<td>26.5 (14.4)</td>
<td>3.5</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Audiometer (dB):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right ankle</td>
<td>36.4 (12.2)</td>
<td>55.0 (14.2)</td>
<td>4.7</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Left ankle</td>
<td>35.6 (13.8)</td>
<td>55.6 (14.3)</td>
<td>4.6</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Right tibia</td>
<td>34.9 (13.7)</td>
<td>52.3 (15.2)</td>
<td>4.1</td>
<td>&lt; 0.001</td>
<td></td>
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<tr>
<td>Left tibia</td>
<td>35.2 (13.2)</td>
<td>53.4 (14.8)</td>
<td>4.4</td>
<td>&lt; 0.001</td>
<td></td>
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<td>Tuning fork (arbitrary units):</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right ankle</td>
<td>7.9 (0.7)</td>
<td>4.6 (3.0)</td>
<td>3.2</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Left ankle</td>
<td>7.9 (0.4)</td>
<td>4.7 (3.0)</td>
<td>3.2</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Right tibia</td>
<td>7.8 (0.8)</td>
<td>4.9 (2.5)</td>
<td>3.0</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Left tibia</td>
<td>7.9 (0.3)</td>
<td>5.2 (2.8)</td>
<td>4.4</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Body sway (mm/min):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eyes open</td>
<td>145.2 (43.4)</td>
<td>497.2 (678.7)</td>
<td>4.9</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Eyes closed</td>
<td>280.4 (156.5)</td>
<td>1150.3 (1795.5)</td>
<td>5.1</td>
<td>&lt; 0.001</td>
<td></td>
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<tr>
<td>Romberg</td>
<td>1.9 (0.6)</td>
<td>2.7 (1.0)</td>
<td>3.6</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>(eyes closed/eyes open)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foam: eyes open</td>
<td>178.1 (66.7)</td>
<td>468.7 (576.5)</td>
<td>4.1</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Foam: eyes closed</td>
<td>356.8 (128.9)</td>
<td>1118.7 (790.7)</td>
<td>5.3</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Foam: Romberg</td>
<td>2.1 (0.6)</td>
<td>3.0 (1.2)</td>
<td>2.9</td>
<td>0.003</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1  Scatterplot of vibration thresholds measured at the right ankle with the neurothesiometer in “volt units” (VTHRA) and with the audiometer in dB (AUDRA) for patients with axonal and demyelinating neuropathies, and for normal controls.
Occlusion effects minimized by insert earphones, too

- While supra-aural earphone OEs were:
  - 250  500  1k
  - 21   18   3

- Insert earphone values were:
  - 250  500  1k
  - 17   12   3

- Less area of ear canal to vibrate w/ insert earphones

- We will use the more traditional
  - 250  500  1k
  - 15   15   10

With 10-15 “safety pad” you are OK if the person’s OE is bigger than average
What size OE for this patient?

15 / 5 / 15 / 5 / 5 – so my patient isn’t average
If it’s critical, you can measure the OE size

- Just as I did in my error, test w/ ear unoccluded. Retest occluded w/o masking. The difference is the OE. You could add that value when masking rather than estimating.
- Fortunately it’s seldom that critical!
Defining Effective Masking

- EM definition – if masking noise of that level is in the ear, and the tone is put into the same ear at equal in intensity, you have masked. E.g. 50 dB EM masks 50 dB PT in SAME ear.

- So, if crossed over… if the tone crosses over at 10 dB HL, theoretically, putting in 10 dB EM in NTE, that would be enough (if there is no conductive loss to reduce the level at the cochlea.)

- Padding adds a safety factor (e.g. the IA is a little lower or OE bigger than you think, or if the calibration is a little off.)
Where are you in your thoughts on masking?

- Some really thinking clicker questions…

And a gratuitous Dixi picture, since I know you've missed seeing her!
Q #1. If a signal crosses over, think about whether it could be heard by examining the relationship of the crossed-over signal to…

50% 1. NTE air conduction threshold

50% 2. NTE bone conduction threshold
Masking noise is put into the

25% 1. Test ear by air conduction

25% Test ear by bone conduction

25% 3. Non-test ear by air conduction

25% 4. Non-test ear by bone conduction
Over masking occurs when...

1. The masking noise prevents the **TE** from hearing the signal

2. The masking noise prevents the **NTE** from hearing the signal
Over masking is a problem when

1. The NTE noise crosses over by air conduction
2. The NTE crosses over by bone conduction
Is the interaural attenuation the same for air-conducted tones and for air-conducted NBN masking?

50% 1. Yes

50% 2. No
Plateau Review

- If masking is needed, begin with the NTE threshold + OE if testing bone + safety pad.

- E.g. AC. Testing right, put 20-25 EM left (threshold plus your 10 or 15 pad)
• Assume the unmasked R threshold was due to crossover – heard by left bone. Now the left ear has 25 dB of masking noise and will not hear the crossed over pure tone. The threshold will shift. How much? Can a 70 dB tone be heard? (next slide)
70 can’t be heard,
75 can’t be heard,
But 80, yes!

Crossover = 20 at NTE.
Masking = 25, so the
crossover is not heard.
Tone needs
to be 80 to
be audible.

Actual threshold = 100
Plateau steps

- Increase the masking in 5 dB increments until you have at least 3 increases (15 dB plateau) with no change in threshold.
- *(I am going to raise the noise 10 for a few slides to speed things along.)*
Undermasking

With 35 dB of masking noise in the NTE, and with a 50 dB IA, the noise will prevent hearing of 85 dB HL tone. The new threshold is 90 dB HL.

Actual threshold = 100
Noise up 10 more

The crossed over signal can be heard once the test ear signal is raised to 100 dB HL, but at this point, it also stimulates the test ear, since its threshold is 100.
The crossed over signal is no longer heard. At this point it is prudent to think... could my masking noise be crossing back to the test ear? Not a problem here. Noise = 50, minus IA of 50, it is only zero at the test ear cochlea which won’t prevent hearing of 100 dB HL AC tone.
15 dB plateau
Clinically, you would stop

Noise 55,
Noise 60...
Does not change threshold any

Actual threshold = 100
The traditional masking technique is to increase the noise in 5 dB steps for three sequential times. No threshold shift = plateau.

Why not increase noise by 15 dB? If there is no shift, you are done! Faster! If there is a shift, then just go back to the 5 dB way of doing it and find the plateau.
Your patient wouldn't like it, but you could continue to increase the noise, and noise even up to 100 dB EM won't alter threshold.

100 dB EM crosses back at 50 dB in the test ear, and that doesn't prevent hearing of the 100 dB HL tone in TE.

Actual threshold = 100
In simple cases such as this unilateral SNHL, the plateau is wide. The hint of “go up 15 dB with your masking noise” will work well.

Lead in to formula masking. If I think it’s a case like this, where the real plateau is wide, then I will be selecting a noise level that should put me well on the plateau. I put in that noise, find the threshold. I do some checking to see if all is well. If so, there is no increasing the noise level and re-measuring threshold. Done!

Formula masking does not use sequential noise adjustments so it is even faster than the “up 15 & check” if you have estimated the range of the “real threshold” correctly.
When to mask PT AC. First rule is:

1. When the two ears differ in AC thresholds by 40 dB for TDH or 50 dB for inserts

2. Masking, we’ve done that before?
Does anyone remember a second “when to mask PT AC” rule?
And the answer is…

- Compare the AC threshold to the non-test ear BONE conduction threshold.
  - The signal crosses over to the NTE cochlea and of course, BC tests the cochlear reserve.
What is “central masking” and how big an effect is it?
Next “plateau & think” case

- Right ear unmasked AC threshold = 60
- Left ear unmasked AC threshold = 20
- Testing with **insert** earphones.
- At this point, do you know if you need to mask?
What if… left bone is normal?
Introducing MASKING HEAD

- We are going to switch away from this example in the next slides, sorry.
- Generic info about audsim & masking head next.
- The worst problems masking come in with TDH earphones, w/ IA of 40, so we are going to switch to that example.
Pink = signal, Green = noise
Test ear always on the left
If it helps…

- You could think of masking head as looking down on the person where the test ear is always the left ear.
Or when you are testing the right ear, think of the head...
Cochlea... towards the center (OK, not anatomically correct...)
Next, we will step through using masking head to determine if a sound is or is not heard / is or is not masked properly.

- Step 1. Calculate the crossover to the NTE COCHLEA
- Step 2. Compare crossed over signal to BC NTE threshold to determine if masking is necessary – will this crossed over AC tone be heard?
- Step 3. Find out what level of masking noise is needed to prevent the crossed over sound from being heard.
- Step 4. Determine how much noise can cross back to the TE cochlea
- Step 5. Compare the crossed-back level to the TE bone conduction threshold. If the cross back is equal to or greater than the TE BC threshold, overmasking is problematic.
Step one, calculate the crossover to the NTE COCHLEA:

- TE stimulus level minus the IA = level at NTE cochlea
- Note: the crossed over signal level doesn’t change if it’s conductive problem. Has nothing to do yet with the NTE middle ear condition.
Masking will occur if you get the noise in the NTE cochlea to be equal to or greater than the stim level at NTE cochlea.
Masking head is teaching you to think about masking. Not real life.

- It shows you what the actual “true” thresholds are. (Your measured thresholds may differ due to test/retest variability and/or central masking.)
Step 2. Compare crossed over signal to BC NTE threshold to determine if masking is necessary – will this crossed over AC tone be heard?

Step one was see if it crossed over, step two is see if you care!
But… if the signal were louder

What level here...

TDH earphones
Returning to our original example slide 53: application of step 2

AudSim often, but not always, uses minimal IA values. They are so low you think there's an error. Remember: if using TDH earphones the values are low.

This patient's actual IA = 60
What’s step 3?

- Step three in general is to find out what level of masking noise is needed to prevent the crossed over sound from being heard.
- This is the formula part, but in this lecture we are going to look at the elements that go into that formula.
Air bone gap in NTE (or TE) – doesn’t reduce the crossover!

But it will increase the level of noise needed in the NTE.

Let’s see how that works … next slide
Let’s plateau.
NTE Thresh + 15. Clickers please!

50% 1. Heard
50% 2. Not heard
ABG reduces effectiveness of NTE noise

But the “15 at the cochlea” is enough to keep you from hearing 0 crossover
What will this patient’s threshold be w/ 35 c-EM?

Work backwards – level at NTE cochlea needs to be 20 to be heard + IA = threshold at test ear
Plateau it
Increasing the noise 10 only shifts threshold 5, because it is now heard in TE
Let’s try the shortcut. Increase noise 15 dB & see if threshold stays the same

- Good so far…
But, we also have to consider “cross back” – NTE noise to TE cochlea

- We are OK. The cross back noise at 0 won’t keep the TE cochlea from hearing the 25 dB at the cochlea tone.
Let’s continue the plateau
Still no problem w/ cross back
Problem! Threshold is increased because of the overmasking.

To be heard, the tone in the test ear has to be above the EM level crossing back.
When overmasking, increasing noise 10 shifts threshold 10

Plateau width > 35
All is fine
Conductive loss in NTE narrows plateau width

- When the noise in the NTE has to be raised to compensate for the ABG, you will find that the noise crosses back to the test ear sooner.
  - You need a lot of noise to “get through” the conductive component in the NTE and properly mask.
  - Just a bit more and you will be crossing back and overmasking.
Let’s make the NTE ABG even larger to further illustrate that ABG NTE reduces plateau width.
Let’s plateau.

NTE Thresh + 15

How do I know the threshold will be 80? I looked at the NTE noise (15), I know the crossed over level has to be 20 to be heard. I can see the IA.
To save a bit of time in this illustration, let’s turn the noise up in 10 dB increments.

- Signal now heard in TE

Not heard in NTE, right?
Noise to 80. Still good … still heard in TE. We are not over masking.
Now overmasking

Plateau width = IA − ABG = 15 dB. If you tested 65 masking noise you would see that 15 plateau, so clinically, you could plateau this patient if you were careful.

A reduced plateau width
The dictionary defined “dilemma” as

1. A difficult situation, one that requires considerable effort to resolve.

2. A predicament that defies a satisfactory resolution – there are no good choices (damned if you do…)

The ‘hard case’ we just went through is NOT a masking dilemma
Note: in ethics dilemma =

- When two solutions have equally balanced alternatives
  - E.g. action A hurts person B; the alternative, action C, hurts person D. One has to do either action A or action C, even though you don’t want to hurt anyone.
Masking dilemma

- I need to mask, if I don’t the threshold will be incorrect, it will be of the NTE potentially.
- If I mask, the TE threshold will be elevated and inaccurate.
- I need to mask, I can’t mask
The greater the NTE ABG, the narrower the plateau.

Masking dilemma = when you can't mask, it crosses over as soon as the noise is effective.

- Next example, let’s make the ABG in the NTE = to that in the TE and = to the IA.
Let’s make the NTE ABG even larger to further illustrate that ABG NTE reduces plateau width.
Let’s plateau.
NTE Thresh + 15

75 dB of masking shifts test ear threshold
but the sound is heard in NTE
While undermasking, increasing masking 5 increases threshold 5.
Raise the noise 5 more – sweet! Masked. Wait, nope, overmasked!
Raising noise just causes more crossover, elevating threshold.

Now it could be crossing again...
When threshold was raised by overmasking, the each time you increase the masking noise 5 dB threshold increases by 5 dB.
When the noise required to exclude NTE participation shifts the TE threshold... when you go right from undermasking to overmasking...
Bilateral conductive loss

- May narrow the plateau
  - But you may find plateau if you look carefully
  - If narrow, note on your audiogram with asterisk – “narrowed plateau width” in comment section

- Maximum conductive loss bilaterally is a masking dilemma. You cannot mask.
  - If you are “chasing threshold” and cannot plateau, you know you have a problem!
What that “chase” starts as
And what it ends up looking like

- Which of course, makes no sense. Both ears can’t be dead if you had responses from one/both unmasked!
In years past, students reported that AudSim *wasn’t working right*. They measured dead ears bilaterally, yet the results showed that the patient had hearing. *The problem must be with the computer, this doesn’t happen in clinic!* (And the student swears s/he knows how to mask.) (How often do you see bilat moderate conductive loss in clinic?)
Plateau masking is the old stand by

Conductive loss in NTE narrows plateau widths. (Note narrow plateau on audiogram in comments section.)

In cases of a large conductive loss in the NTE, there may be no plateau, which is a masking dilemma.
Leading us towards formula masking

- If there is conductive loss, particularly in NTE, formula masking may be too "tricky". If you can, plateau.
- There are certain times when you cannot plateau, though
  - ABR
  - Word recognition testing
  - You have to formula mask, but you also have to recognize if that isn’t going to work.
What, no talk of bone conduction?

- We will discuss bone conduction formula masking as well.
- What is IA for bone?
- What is the “rule” then for when to mask for bone?
  - ABG in TEST ear.
Why is that the rule?

- What is the site of lesion in this case?
- Would contra masking make the bone scores better or worse?
- Other than t/rt var & cal var, can bone be worse than air?
- Would you care if the minor air-bone gaps closed?
If there are ABGs, I do care

- My diagnosis changes if, with masking, the left ABGs are eliminated.
Vibrotactile thresholds

- When does an AC signal become VT?
- Bone?
  - Does everyone have equal VT thresholds?
  - Will a VT shift w/ contra masking?
#s to use for this class

- Thresholds may be vibrotactile if equal to or above:

<table>
<thead>
<tr>
<th></th>
<th>250</th>
<th>500</th>
<th>1000 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Conduction</td>
<td>85 dB HL</td>
<td>105 dB HL</td>
<td>120 dB HL</td>
</tr>
<tr>
<td>Bone Conduction</td>
<td>25 dB HL</td>
<td>55 dB HL</td>
<td>75 dB HL</td>
</tr>
</tbody>
</table>
And what does VT have to do with masking?

- If you know a BC threshold is VT, it won’t shift higher with contralateral masking.
- Masking a VT is senseless; masking if you are unsure if it is or is not VT does make sense.

What does the > indicate? Left ear hearing sensitivity?
Purpose: to have you recognize when masking is needed, not just using the “easy rule” of 40/50 dB difference between air conduction thresholds, but the rule of 50 dB from AC to NTE BC
The Rules

- See assignment

- Notes to self: in class start cases 1 & 6
Self-test Questions

- What is meant by “formula masking?”
- What are some cases where you can not plateau mask?
- How does an AC signal cross to the NTE?
- How does masking noise cross back to (potentially) over mask?