Materials for “Ultimate Esthetics”:

<table>
<thead>
<tr>
<th>MICROFILL</th>
<th>HYBRID</th>
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<tr>
<td>MICROHYBRID</td>
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MICROHYBRID = HYBRID (Nanofills also act basically as a hybrid)
MICROFILL is the different composite

Material review for the layering TECHNIQUE:

<table>
<thead>
<tr>
<th>4 basic materials in layers</th>
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<tbody>
<tr>
<td>lingual</td>
</tr>
<tr>
<td>facial</td>
</tr>
<tr>
<td>• microhybrid/nanofill</td>
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<tr>
<td>• opaquer</td>
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<tr>
<td>• tints</td>
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<td>• microfill/nanofill</td>
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Ideal technique = “Cookbook technique with infinite flexibility”

<table>
<thead>
<tr>
<th>MICROFILL</th>
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<tr>
<td>fracture susceptible</td>
<td>fracture resistant</td>
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<tr>
<td>highly polishable</td>
<td>polish fades</td>
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<tr>
<td>= ENAMEL (facial layer)</td>
<td>= DENTIN (&amp; lingual layer)</td>
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<table>
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<tr>
<th>OPAQUERS</th>
<th>TINTS</th>
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<tr>
<td>blocks color</td>
<td>enhances color</td>
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<tr>
<td>raises value</td>
<td>lowers value</td>
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<tr>
<td>use sparingly</td>
<td>use sparingly</td>
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</table>
Layering TECHNIQUE: 13 Technique Steps

1. make template
2. take shade
3. preparation
4. load template
5. etch & adhesive
6. lingual layer—build support (microhybrid/nanofill)
7. dentin layer—lobe formation, control “show-thru” (microhybrid/nanofill)
8. opaques—block color, junction, defects (can use opacious composites)
9. tints—enhance color
10. facial enamel layer (microfill/nanofill)
11. final cure
12. contouring
13. polishing

INCISAL TRANSLUCENCY
may be created with

DENTIN INNER-TINTING
or

ENAMEL INNER-SCULPTING

• make template (putty index):
  make in advance on a duplicate model of the wax-up so don’t risk damaging actual wax-up;
  OR make at time of treatment directly in mouth using existing restoration or mock-up;
  allow time to de-gas (5-30 minutes depending on material);
  recommended for up to 6 anterior teeth—upper or lower; may be difficult to control more than 6 restorations at once; additional restorations can be done once anteriors are completed

- Fabricate using a rigid material (ex: Template, Flexitime putty, Regisil Rigid).
- A trimmed piece of plastic can be used for a flat plane during fabrication.
- Should be 5 mm thick to maintain rigidity.
- Trim so facial of tooth is completely exposed while maintaining incisal and lingual surfaces (so trim exactly along Facial-Incisal line angle).
- Trim at same angle as facial surfaces (this example is trimmed well on patient’s right side, but is trimmed at an angle on the other side.
- Should extend 1-2 teeth past last tooth to be treated.
- Try in to assure seats fully before prepping

• take shade:
  • determine shade first before dehydration can occur
    (may occur quickly on some teeth);
  • shade guide should be arranged by value (brightness);
  • make “customized shade tab” with actual composite in 2 or 3 best matching shades (place small pea-sized ball of composite onto tooth and flatten with Mylar strip, cure 10 sec.)

NOTE: moisture control: key is to have a compliant patient with healthy tissue
  • dental dam may be used but if will distort papilla alternatives should be considered;
  • bite block and saliva ejector can work very well
• minimal prep:

PREP STEP 1  BEVEL FACIAL

✓ only if visible in the esthetic zone
   a bevel is not required for retention…purpose of bevel is for esthetics only (so there is a “blending zone” between composite and tooth structure)

✓ length should be about the same as length to be added
   make bevel about as long as composite to be added (ex: if fracture is 3 mm long then bevel should be approximately 3 mm long) but at least 1.5 mm long to assure adequate “blending zone”

✓ should not be deeper than half the thickness of the facial enamel
   exception: if tooth needs to be brightened overall then prep bevel deeper so is nearly to dentin and increase length of bevel to veneer most or all of facial surface

✓ should gradually become shallower until bevel ends
   NO chamfer or finish line, the bevel just ends on the facial surface

PREP STEP 2  “MICROSCOPICALLY ROUGHEN” worn surfaces with a fine diamond bur:

✓ freshen any sclerotic dentin to increase bond strength

✓ if recent fracture, may need to smooth jagged edges

PREP STEP 3  ROUND OFF SHARP CORNERS

✓ goal is to expose the ends of 5-10 enamel rods, so this is a very slight rounding off of any sharp corners; adhesion is better to the ends of enamel rods rather than to the sides of enamel rods

PREP NOTES:

✓ prep should be extremely conservative and only if needed

✓ before etch and adhesion, pumice any unprepped tooth structure so no plaque, stain or pellicle remains, which would reduce bond strength (fine or flour pumice and water on a prophy cup)

✓ assure interproximal contacts are light enough for Mylar strip to slide through
• load template:
  reseat and evaluate template for accuracy and amount of “fill” needed; then place appropriate amount of composite into template; goal is to form entire lingual surface and incisal edge, layer should be thin—but not paper thin—so don’t overfill; smooth composite so no rough areas or edges; create a narrow gap between adjacent restorations to keep teeth separate
  store loaded template with uncured composite in the dark (cover or place in a drawer)

• etch & adhesive: 3 stage etch then place adhesive
  1) unprepped enamel: etch about 60 seconds
  2) prepped enamel: etch 15-60 seconds
  3) dentin: no more than 15 second etch!!

• lingual layer—build support (microhybrid/nanofill)
  lingual layer needed if adding length, width, or have a Class III or IV
  using a template (putty index) is ideal for this
  should be thin enough to allow plenty of space for following layers
  should not be paper thin, so has some strength and fracture resistance while working
  should light cure each increment or layer 10 sec (to set it so won’t move/distort when placing subsequent material); final cure for 60 sec once restoration has been completely built up

NOTE: before seating loaded template, if there are any hard-to-reach areas on the tooth—concavities or depressions—to assure good adaptation of composite to tooth structure, directly place a minimal 1st increment on the tooth to cover worn incisal edge and/or hard-to-reach area; don’t light cure unless you can be certain this increment would not interfere with fully seating the loaded template;

seat template with uncured composite, then:
  • smooth “cleavage”
  • sculpt to allow space for subsequent layers; this lingual layer should be thin but not paper thin
  • use thin-bladed instrument to clear contact areas so teeth don’t bond together
  • light cure each tooth 20 sec (twice as long as average since may be curing through tooth structure)
  • remove template
  • check lingual surface and sculpt to smooth any uncured composite that may have pulled away; cure
  • separate if teeth are connected with curved scalpel or serrated metal strip (should be very minimal if cleared contacts as described 4 steps above)
  • add to any gaps or rough surfaces (unfilled resin, gently air thin, small increments of comp. or flowable)
  • add enough composite to reinforce any very thin areas to minimize risk of accidental fracture; cure
  • use curved scalpel or contouring strips to assure lingual-proximals are smooth and properly contoured
  (if rough or over contoured it will probably be impossible to achieve correct contacts)
• ADDITIONAL STEP IF BRIGHTENING THE TOOTH: pink opaquer is used to brighten a tooth, disguise an extremely dark area, or cover metal, and would be used prior to dentin layer (for uses of other opaquers, wait until after dentin layer is placed);
Most restorations should blend with existing tooth structure—rather than brighten the entire tooth—so using pink opaque would be contraindicated in those (i.e. Class IV restorations and diastema closures)

for upper incisors should choose either #1 or #2

Choose technique for creating incisal translucency:
1) Dentin inner-tinting (steps are immediately below),
2) Enamel inner-sculpting (steps are on next page), or
3) Neither: for all teeth except upper incisors

INCISAL TRANSLUCENCY—DENTIN INNER-TINTING
next 3 steps are used to create incisal translucency in the dentin layers
• dentin layer: lobe formation, control “show-thru” (may use microhybrid or nanofill)
  if restoring an upper incisor, consider creating the 3 developmental lobes that form the frontal portion of the tooth to mimic natural incisal translucency (a 4th lobe forms the cingulum but doesn’t affect incisal translucency)
composite that is very thin around lobes (where tint will be painted on shortly) should have an irregular surface so tint will have a less uniform intensity so looks more natural proper thickness and opacity to eliminate “show-thru” of the tooth through the restoration composite should not extend onto facial of bevel or to proximal surface choose pattern appropriate for central or lateral, or to match adjacent natural tooth:
•

PATTERN OF INCISAL TRANSLUCENCY IN UPPER CENTRAL AND LATERAL INCISORS

upper central incisor: typical pattern demonstrates 3 developmental lobes that are fairly well defined but indefinite enough so doesn’t appear man-made

upper lateral incisor: typical pattern demonstrates 3 developmental lobes that are so poorly defined that it should be difficult to tell they are separate lobes

• opaquers: paint on to block color, disguise junction lines, hide defects (or may use opacious composites)
opaque shades are keyed to body shade to blend with surrounding tooth structure or composite the goal is to no longer see the defect, but NOT to see outline of opaquer
opaquers can also be used to accentuate 3 developmental lobes
pink opaquer is a unique product to be used only when entire tooth is to be brightened significantly; Class IV composites, diastema closures, and most restorations that are not full veneers should blend with existing tooth structure so use of pink opaquer would NOT be indicated (see “Additional Step If Brightening the Tooth” above)
• **tints** (enhance color): take care not to use too much, effect should be very subtle
  
  tint shades for incisal translucency are gray, violet, and occasionally blue
  
  for most teeth the best shade is a 50:50 mixture of gray and violet
  
  lightly paint in to accentuate 3 developmental lobes
  
  (don’t cover any portion of lobes)
  
  if pattern and thickness is too regular and defined, it will appear man-made (vary thickness/intensity and pattern so looks natural)

• **facial enamel layer** (may use microfill or nanofill):
  
  if incisal translucency is built into the dentin layers, a single layer of composite should be placed over that to form the facial enamel layer, extended to the proximals so the Mylar Pull technique can be utilized to form the proximal contacts and surfaces (more info below)
  
  typically the goal “body” shade composite is used for the facial enamel layer (it should be fairly translucent and thin to allow the dentin inner-tinting to be visible)
  
  sculpt so slightly over contoured (so have some composite to remove when contouring)

• skip to “Mylar pull” if dentin inner-tinting was used to create incisal translucency since it’s better to use only one of the incisal translucency techniques. Using dentin inner-tinting and enamel inner-sculpting is likely to result in too much translucency.

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**INCISAL TRANSLUCENCY — ENAMEL INNER-SCULPTING**

after building the lingual layer, follow these steps to create incisal translucency in the facial enamel layers

• **dentin layer** (may use microhybrid or nanofill):
  
  there is no lobe formation in the dentin layer if you plan to create incisal translucency with the enamel inner-sculpting technique,
  
  it is still used to control “show-thru” composite should not extend onto facial of bevel or to proximal surface

• **opauqers**: paint on to block color, disguise junction lines, hide defects (or may use opacious composites)
  
  opaquer shades are keyed to body shade to blend with surrounding tooth structure or composite
  
  the goal is to no longer see the defect, but NOT to see outline of opaquer
  
  pink opaquer is a unique product to be used only when entire tooth is to be brightened significantly; (see “Additional Step If Brightening the Tooth” above)

• **tints**: are not used to enhance incisal translucency when using the enamel inner-sculpting technique
• facial enamel layer (may use microfill or nanofill):
  2 different shades of composite are used to create
  incisal translucency in the facial enamel layer

  1) “body” shade:
     (depending on brand, may be labeled “universal” or
     “body” shade)
     place enough composite onto facial surface so shouldn’t
     need to add more (it’s better to sculpt away and waste
     some composite than to add additional increments
     which increases the chance of trapping air bubbles
     and wasting time having to do a repair)
     sculpt to full contour then use Multi-use instrument
     (Cosmedent) to create enamel inner-sculpting
     Mylar Pull to form proximal surfaces (may need to
     “touch up” inner-sculpting after Pull)
     light cure 10 sec

  2) “translucent” shade:
     (depending on brand, may be labeled “enamel” or
     “incisal” or “translucent”)
     place and condense translucent composite into
     depressions created in step 1; since the
     innersculpting is in the incisal 1/3 of the facial
     surface only, the incisal shade will not extend
     onto the proximal surfaces or the cervical portion
     of the facial
     blend slightly beyond innersculpting onto cured body
     shade (should not be able to tell where one
     composite starts and the other stops)
     light cure 10 sec
MYLAR PULL is using a Mylar strip as an instrument rather than as a matrix

Advantages:
- allows convex contour from gingival to incusal on proximal surfaces
- helps adaptation of uncured composite to underlying cured composite or tooth structure, so as to avoid voids or gaps
- improves ability to fine-tune sculpting since no Mylar strip is in the way

Example of Mylar Pull on model (here showing mesial first, then distal second): Place clean Mylar strip into sulcus on mesial, then place composite to form the facial layer and cover bevel, sculpt so mesial half is slightly overcontoured but “tuck in” where touching Mylar strip, smooth and blend facial composite, now you are ready for the Mylar Pull.

Mylar Pull TQ: use instrument to gently push Mylar strip towards middle of tooth; this forms the facial embrasure as you pull the strip straight to the lingual while moving instrument from gingival to incisal

After Mylar strip is pulled through, refine sculpting, then light cure 10 sec. Repeat steps above on distal starting with placing Mylar strip into sulcus, sculpt composite, do Mylar Pull, refine sculpting, cure
MOPPER POP is used to separate teeth that are not bonded, but only “stuck” together. The Mopper Pop is used if floss won’t slide through the contact after light curing. If you are certain that the surface adjacent to the newly cured composite is either enamel (that isn’t prepped or etched) or polished composite (see NOTE above) then take an 8A instrument and insert it into the gingival embrasure. Push the edge of the blade against the contact and barely torque the instrument between the teeth. Warn the patient that they will feel a little pressure and hear a pop, otherwise they will think you’ve broken something.

Troubleshooting the Mylar Pull:

PROBLEM: too much or all of the uncured composite pulls lingually leaving inadequate bulk to complete the facial and proximal layer
SOLUTION: lingual layer must be cured composite or tooth structure…there must be lingual support for the Mylar Pull to work

PROBLEM: there isn’t enough composite in the cervical area to complete the facial and proximal layer
SOLUTION: pull the Mylar strip directly lingual, don’t allow it to drift incisally (it should not drift out of the sulcus)

PROBLEM: moisture infiltration—bleeding or sulcular fluid
SOLUTION: slip unwaxed floss into sulcus (preferably of adjacent tooth) to wick away a slight amount of moisture

CREATING AN IDEAL CONTACT: after the Mylar Pull, if the uncured composite is in contact with the adjacent tooth, this is a great method of creating an ideal contact between them

NOTE: to avoid bonding the uncured composite to the adjacent tooth or restoration, the adjacent surface should be:

1) enamel that is not prepped or etched,
2) composite that is polished

because composite can’t bond to either of these surfaces

If the adjacent surface isn’t one of these two, the Mylar Pull can still be used but stop pulling just before the Mylar strip comes out. Leaving just 1mm of the strip between the teeth will still allow most of the advantages of the Mylar Pull while assuring that no bonding at the contact occurs.
• final cure:
  glycerin gel used over entire restoration to block oxygen from inhibiting the cure
  (goal is to eliminate the oxygen inhibition layer); cure all areas of restoration at least 60 sec;

  it is OK to do the final cure later, if more convenient, as long as it is done before the final polish

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<tr>
<th>Finishing = Contouring + Polishing</th>
<th>2 SEPARATE STEPS!</th>
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<td>better not to think of last step as “finishing” but as two steps, since they have very different goals</td>
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• contouring:

  contouring is THE MOST COMMON MISTAKE made with composite bonding

Focus on primary anatomy first (outline form from any view: facial, incisal, profile, etc)

Once 1º anatomy is acceptable, then create subtle 2º anatomy (for instance the “undulations” on the facial of upper centrals: 2 slight depressions that correspond to the 3 developmental lobes)

  Question to ask yourself to determine if this step is complete: “Do I LOVE the contours?”

  Contour intentionally—don’t contour without a specific purpose—if you aren’t sure what you want the bur or disk to change, it’s time to stop so you can come back to it later with “fresh” eyes

  Check that there are no surface defects!

• polishing: creating a shiny surface (or matching the degree of shine desired)

  should be very quick when contouring is correct
Contouring—remember to *contour intentionally*!

- understanding tooth topography is invaluable when contouring restorations
- contouring is the process of adjusting the contours, it’s NOT polishing
  - ALL contouring should be complete prior to ANY polishing
- focus on 1º anatomy first = outline form from facial, incisal, and profile views
  - start contouring with ET and OS burs (Brasseler) or *FlexiDiscs* (coarse or extra-coarse; Cosmedent)
  - complete contouring with medium grit *FlexiDiscs* (NO surface defects should be evident)
  - proximal surfaces can also be contoured with coarse/medium grit *FlexiStrips* (Cosmedent)
- 2º anatomy should be contoured after 1º anatomy is complete and is exactly as desired
  - use ET bur, Supra Step 1 wheels or cups, Enhance wheels or cups, or *Flexi Cups* (blue)
  - ask yourself if you *love* the contours before proceeding to the next step
- repair surface defects after contouring 2º anatomy (see composite repair section)
- when using contouring strips supragingivally, hold in an “S” shape rather than a “C” shape to preserve the contact

![Contouring Tools](image)

**ET bur**
**coarse then medium FlexiDiscs**
**FlexiStrips**

“S” shape is correct for supragingival contouring

“C” shape is more likely to open contact, but is correct for SUBgingival contouring

Polishing

- polishing should be much quicker than contouring
  - if surface defects are present, polishing will make them MORE evident
- for facial and lingual surfaces: Supra Step 2 cups are great for polishing, Pogo cups are, too; if prefer to use disks:
  - start with fine grit *FlexiDiscs* (yellow), then super-fine (pink); if desire more surface texture, one option is to skip
  - the polishing cups or disks, and jump to polishing paste step (below)
- proximal surfaces should be polished using fine strips
- complete with Enamelize (aluminum oxide paste) on a *FlexiBuff* felt disk
  - use unwaxed floss (quadrupled) before rinsing off polishing paste to complete proximal polish
**INVISIBLE MARGINS:** a composite margin can be undetectable if properly developed

- sculpt composite onto unprepped enamel for most predictably invisible margins (even when in the middle of the facial surface)

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**Class III**

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**Class IV**

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**Class V**

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**Diastema Closure**

article regarding diastema closure technique is available by request
**Repair of composite (during initial placement of restoration)** should be done prior to polishing

Use large, round, fine-grit diamond bur (Brasseler 8801-018)  
Bur should engage only deep enough to make a saucer-shaped prep, a beveled margin is desired, *not* a butt joint

Then etch (to clean), apply a thin layer of unfilled resin (but do not light cure)

Place and sculpt the composite without over bulking it much, light cure  
contour the repair, then polish the restoration

If surface has already been polished before repair, added composite will *not* bond to polished surface, so either roughen surface around repair or contour past the previous polished surface

**Repair of composite (found after restoration completed)**

For microhybrid or nanofill repairs that are more than one day old, same as above except also sandblast (micro-etch) prepped area prior to acid etching

For microfill repairs, do *not* sandblast, because microfill particles are so small and uniform that sandblasting will DECREASE retention. Retention when repairing microfill is purely mechanical from the small bur marks.
Polish to rejuvenate

• “polish to rejuvenate” technique is to improve stained margins on old composite (for beveled margins—butt joint margins would need a repair)

shade change (making a dark tooth bright)

• make template (if restoration doesn’t involve the lingual or incisal surfaces, a template isn’t needed)

• take shade

• preparation

  for shade change, minimal prep is NOT adequate (exception: if plan to add facial bulk)

  Brasseler 8801-018 fine diamond bur

  angled less to get shallower depth cut

  angled more to get deeper depth cut

  round bur angled approximately 45º creates a depth cut of about 1.0 mm

  round bur angled approximately 0º creates a depth cut of about 0.3 mm

  DEEP CUT

  SHALLOW CUT

• etch & adhesive

• lingual layer—build support (microhybrid/nanofill)
  if not adding length, width, or have a Class III or IV involved, then can skip this step
• pink opaquer —since this is a dark tooth, this is one of the situations that requires pink opaquer
NOTE: used prior to dentin layer (for other uses of opaquer, wait until after dentin layer is placed)
paint on as a wash (so some underlying tooth color will show through), want just enough pink
opaquer applied so the value is the same as the adjacent tooth or shade tab that is to be matched

• dentin layer—lobe formation, control “show-thru” (microhybrid/nanofill)
  for a dark tooth situation where pink opaquer is used, this dentin layer is done as much to
  complete the color blocking and disguise the pink opaquer layer
  if restoring an incisor can create the 3 developmental lobes

• opaquer—usually not necessary to add more opaquer if pink opaquer and dentin layer did the job
  shades keyed to body shade so blends with surrounding tooth structure or composite

• tints—enhance color
  used to add contrast to dentin layer/lobes to enhance incisal translucency, but if underlying
tooth structure is dark, this may not be needed

• facial enamel layer (microfill/nanofill)
  final facial layer should use “body” microfill/nanofill (may be labeled “universal”) which is
  usually the basic “goal” shade
  sculpted to be slightly overcontoured (so have a slight amount of composite to remove as
  contouring)
  Mylar Pull helps form the proximal surfaces

• final cure

• contouring
  understanding tooth topography is invaluable when contouring restorations, if you aren’t
  knowledgeable of the shape you are striving for, you will likely be wasting time
  contouring is the process of adjusting the contours, it’s NOT polishing
  ALL contouring should be complete prior to ANY polishing

• polishing
  polishing should be much quicker than contouring
  if surface defects are present, polishing will make them MORE evident
Occlusal Considerations

Building anterior guidance (lengthening anterior teeth):

- guidance path may be lengthened without *occlusal* restrictions (esthetics and phonetics do restrict)
- steeper guidance path requires a transitional phase
- develop two-point contact in protrusive (can eliminate deviation if develop with pt watching in mirror)
- posterior disclusion desired (may need to equilibrate posterior teeth to eliminate interferences, but less with add’l anterior length)

**must control excessive forces to expect longevity**

Building anterior guidance while maintaining V.D. in a Class I patient:

- guidance path not steepened
- steepened path

*incisal edges should always be at least 1 mm thick (if thinner, are susceptible to fracture)*

Other considerations of anterior guidance:

- No posterior interferences in lateral and protrusive movements
- Movements should be smooth with no fremitis (and less pressure on the laterals)
- Plateaus on the edges for a resting place
- Smooth crossover both directions
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