SUPPLEMENTAL DATA

Experimental Procedures:

Participants

Subjects did not participate in all the experiments. Fourteen (8m6f; mean age = 21.8 ± 3.1 years) subjects participated in Experiment 1 with the 200-Hz standard. Twenty subjects (10m10f; mean age = 20.2 ± 2.1 years) participated in Experiment 1 with the 400-Hz standard. Fourteen subjects (8m6f; mean age = 22.9 ± 3.7 years) participated in Experiment 2 with the 200-Hz standard. Nineteen subjects (11m8f; mean age = 19.7 ± 1.2 years) participated in Experiment 2 with the 400-Hz standard. Six subjects (4m2f; mean age = 20.0 ± 1.3 years) participated in Experiment 3 with the 100-Hz tactile stimuli. Five subjects (3m2f; mean age = 20.2 ± 1.3 years) participated in Experiment 3 with the 200-Hz tactile stimuli. All subjects reported normal tactile sensibilities and no subjects reported a history of neurological disease. All testing procedures were performed in compliance with the policies and procedures of the Institutional Review Board for Human Use of the Johns Hopkins University. All subjects were paid for their participation.

Tactile Stimuli

Tactile stimuli consisted of sinusoids (tactile pure tone, tPT) that were equated in perceived intensity. The stimuli were delivered along the axis perpendicular to the skin surface by a steel-tipped plastic stylus mounted on a motor. In experiments with the 200-Hz standard stimulus, the probe was attached to a Chubbuck motor [1] and had a flat, circular contact surface with a diameter of 1mm. In experiments with the 400-Hz standard stimulus, the probe was attached to a Mini-shaker motor (Type 4810, Brüel & Kjær, Skodsborgvej, Nærum, Denmark) and had a flat, circular contact surface with a diameter of 8mm. The probe tip was indented into the skin by 1mm to ensure contact with the skin throughout the stimulus presentation. The Chubbuck motor was equipped with a high precision LVDT capable of micron-resolution displacement output. The Mini-shaker motor was equipped with an accelerometer (Type 8702B50M1, Kistler Instrument Corporation, Amherst, NY) with a dynamic range of ±50g. The accelerometer output was amplified and conditioned using a piezotron coupler (Type 5134A, Kistler Instrument Corporation, Amherst, NY). Both the output of the LVDT and the piezotron coupler were digitized (PCI-6229, National Instruments, Austin, TX; sampling rate = 20kHz) and read into a computer.

Auditory Stimuli

The auditory stimuli consisted of pure tones (aPT) or band-pass noise (aBPN) stimuli with frequencies ranging from 100 to 1600Hz. Stimuli were equated in perceived intensity by the experimenter unless otherwise specified. The aPT distractors (100, 200, 300, 400, 600, 800, 1000, 1500-Hz) were presented at 76.4, 64.0, 61.4, 60.5, 58.8, 57.9, 57.2, and 56.5 dB SPL, respectively.

Stimuli were generated digitally and converted to analog signals using a digital to analog card (PCI-6229, National Instruments, Austin, TX; sampling rate = 20kHz). Auditory stimuli presented during experiments using the 200-Hz tactile standard were delivered binaurally via circumaural sealed headphones (HD280Pro, Sennheiser, Old Lyme, CT). Auditory stimuli presented during experiments involving the 400-Hz tactile standard were delivered binaurally via noise isolating in-ear earphones (ER6i, Etymotic Research, Elk Grove Village, IL), as these also allowed participants to wear noise-attenuating earmuffs (847NST, Bilsom, Winchester, VA). We took this additional precaution because some of the tactile stimuli at the higher frequencies (above 500 Hz) were audible when subjects wore only the headphones. The frequency-response profiles of the headphones were flat in the range of tested frequencies.

Sound-attenuation chamber

To ensure participants were performing tactile frequency discriminations on the basis of tactile cues alone (and not relying on auditory cues produced by the motor), we tested participants' baseline tactile frequency discrimination performance in the presence and absence of contact with the stimulator. We verified that participants could not perform the task in the no-contact condition. The stimulator noise generated by the Chubbuck motor (used in the experiments with the 200-Hz standard) was inaudible. However, stimulator noise was sufficiently loud in the high-frequency tactile discrimination condition (with the

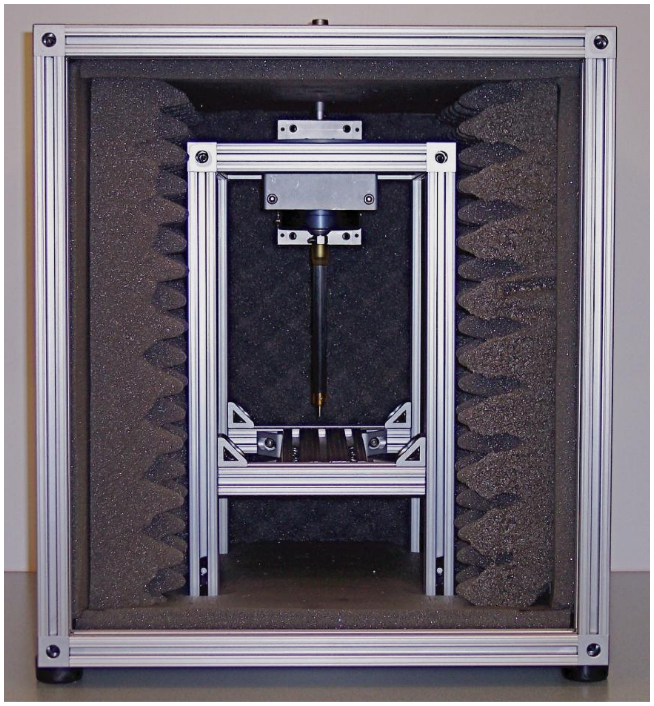

Figure S1 Custom built sound-attenuation chamber. The chamber encapsulates an assembly holding the Mini-shaker motor (used in the experiments with the 400-Hz standard). View shown does not include front wall with entry hole.

400-Hz standard) and required the design and construction of a sound-attenuating chamber to eliminate auditory cues.

The walls of the sound-attenuation chamber (**Fig. S1**) consisted of three layers: a hard polyurethane board (84775K23, McMaster-Carr, Robbinsville, NJ), 1-inch thick polyurethane acoustical foam insulation (5692T49, McMaster-Carr, Robbinsville, NJ), and a 3-inch thick egg-carton polyurethane foam sheet (9710T46, McMaster-Carr, Robbinsville, NJ). The Mini-shaker was mounted to an adjustable stage (UMR8.51, Newport Corp., Irvine, CA) that was supported by a custom-built aluminum frame. The participant placed his or her hand through an entry hole (lined with foam) and rested his or her fingers on a support platform mounted directly below the Mini-shaker and contact probe. The probe was lowered (via the stage actuator) until desired contact with the skin was achieved.

<u>Experiment 1: tactile frequency discrimination with auditory pure tone (aPT) distractors</u>

Tactile frequency discrimination with a 200-Hz standard

Participants sat facing the stimulator with their dominant arms and hands comfortably resting in a half-cast and hand-mold. The restraints were mounted on a height-adjustable vertical stage, which allowed the stimulator to be reliably repositioned for each participant. When the participant was situated, the stimulator was gently lowered onto the distal pad of the participant's index finger and the experiment began. Participants were tested using a two-alternative forced-choice (2AFC) design described in the main text. Comparison frequencies ranged from 100 to 300Hz in 40-Hz increments. The frequency of the comparison stimulus and the stimulus interval in which it was presented were randomized across trials. The frequency of the auditory distractors was 100, 200, 300, 400, 600, 800, 1000, or 1500Hz. Twenty behavioral observations were obtained for every combination of tactile comparison stimulus and auditory distractor over 10 experimental runs distributed across 2-3 sessions. Participants were allowed time to rest between trial blocks. No feedback was provided.

Equating tactile stimulus intensity

Two aspects of stimulus design were implemented to ensure participants did not rely on intensive information to perform the frequency discrimination task. In pilot experiments, we equated the perceived intensity of tPTs at different frequencies using a 2AFC tracking procedure. On each trial, participants were presented sequentially with two 1-sec stimuli separated by a 1-sec inter-stimulus interval. One stimulus (the standard) was always a 200-Hz, 11.2-µm (supra-threshold) tPT; the other stimulus (the comparison) was a tPT at one of the other frequencies used in the frequency discrimination experiments. Participants reported which stimulus was more intense. If the participant judged the standard as more intense, the amplitude of the comparison stimulus increased on the following trial. Conversely, if the participant judged the comparison as more intense, the comparison amplitude was reduced on the following trial. The session concluded when the change in the amplitude of the comparison stimulus reversed three times. The geometric mean of the comparison stimulus amplitudes on the last ten trials of the session was then computed. Three such measurements were recorded and averaged. The resulting mean was the stimulus amplitude at each comparison frequency that was perceived to be equally intense as a 200-Hz, 11.2-μm stimulus. The subjectively-matched amplitudes of the comparison frequencies (100, 140, 180, 220, 260, 300Hz) were 21.4, 14.8, 11.9, 10.7, 10.1, and 9.9μm, respectively. To further ensure that participants discriminated stimuli relying on only frequency information, and not using intensive cues, the actual stimulus amplitudes used during the frequency discrimination experiments (Experiments 1 and 2) were randomly jittered (the maximum jitter was 20% of the subjectively matched amplitude).

Tactile frequency discrimination with a 400-Hz standard

The procedure was identical to that used in tactile frequency discrimination experiments with the 200-Hz standard. In this experiment, the frequency of the standard tPT was 400Hz (presented at 1.13□ m) and the comparison stimuli ranged in frequency from 200 to 600Hz in 80-Hz increments (excluding 400Hz).

To minimize stimulator noise, these experiments were conducted using the custom sound-attenuating chamber described above. To further reduce auditory cues, tPT amplitudes were set to be 20% of the amplitudes equated for perceived intensity with a 200-Hz, 11.2-μm stimulus (see above). The relationship between perceived intensity and stimulus amplitude is described by a power function with exponents of 1 or less [2-4], depending on the frequency of the standard stimulus. Assuming a linear relationship (exponent of 1), the perceived intensity of the high-frequency tPTs would have been 20% of the low-frequency tPTs. To compensate for the lower amplitude of the stimuli, a larger contactor (see above) was used as the sensitivity of Pacinian fibers, which mediate the perception of high-frequency vibratory stimuli, increases dramatically with contactor area [5-7]. We estimate that the increase in contact area led to an approximately three-fold increase in perceived intensity. Thus, the perceived intensity of the high-frequency tPTs was about three fifths that of the low-frequency tPTs. The comparison stimuli were presented at 2.3, 2.1, 1.3, 1.1, 1.3, and 1.3μm, respectively.

Experiment 2: tactile frequency discrimination with auditory band-pass noise (aBPN) distractors

In this experiment, we wished to determine the extent to which the effect of auditory distractors on tactile frequency discrimination depended on the perception of auditory pitch. The procedure was identical to that of Experiment 1. Instead of an aPT distractor, an auditory band-pass noise (aBPN) distractor was presented with the tPT comparison stimulus. The center frequencies (CF) of the aBPN distractors were 150, 300, 600, and 1200Hz, and their bandwidths were proportional to the CF (BW = 2/3·CF). The aBPN distractors were equated in perceived intensity with a 200-Hz, 64.0 dB SPL aPT.

Experiment 3: tactile intensity discrimination with aPT distractors

In this experiment, we wished to determine whether perceived tactile intensity was also subject to interference by auditory distractors. In a 2AFC design, participants were asked to determine which of two sequentially presented tPT stimuli, equated in frequency (100 or 200Hz) but differing in amplitude, was more intense. The standard amplitudes were 14.2 and 7.6μm and the amplitudes ranged from 7.1 to 21.4μm and 3.8 to 11.5μm for the 100- and 200-Hz comparison tPTs, respectively. On most trials, an aPT distractor was presented with the comparison stimulus. The aPT distractors were a subset of those used in Experiment 1 (100-, 200-, 400-, 600-, 800-, and 1000-Hz).

Data Analysis

Psychometric Functions

To quantify participants' ability to discriminate tactile frequency we fit the following psychometric function to the data obtained from each participant:

$$p(f_c > f_s) = \frac{1}{1 + e^{-\frac{f_c - \mu}{\sigma}}}$$

where $p(f_c > f_s)$ is the proportion of trials a comparison tPT with frequency f_c was judged to be higher in frequency than the standard stimulus (f_s = 200 or 400Hz), μ and σ are free parameters corresponding to estimates of the participant's bias

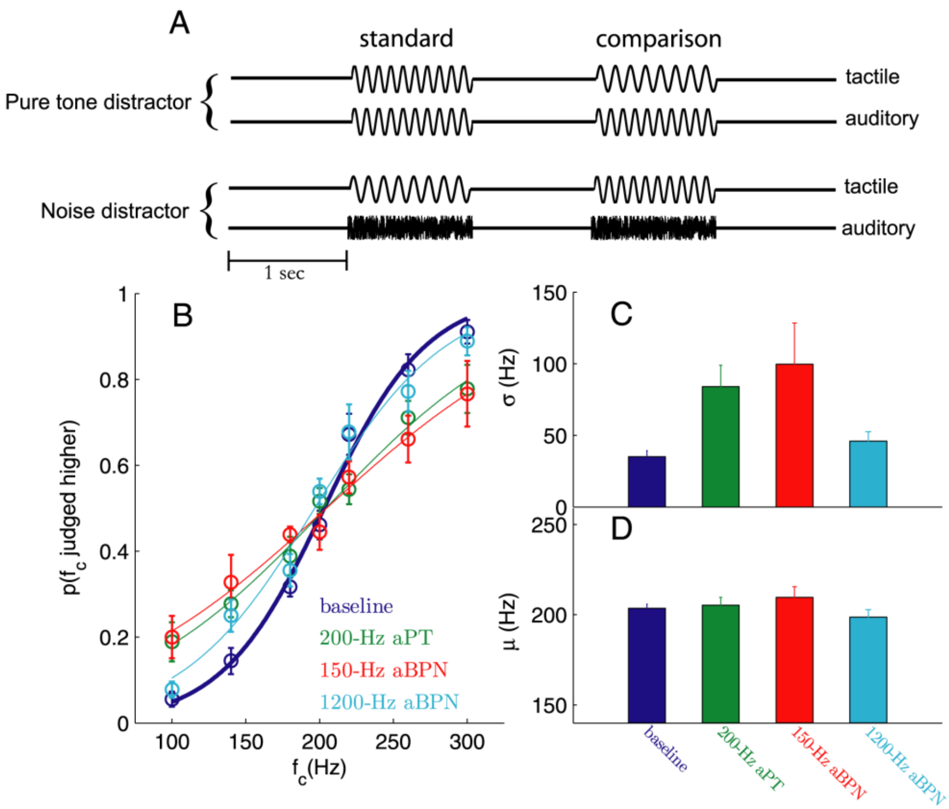

Figure S2 Tactile frequency discrimination with auditory distractors in both intervals. ***(A)*** Experimental design. ***(B)*** Frequency discrimination performance averaged across subjects. Pure tone (200Hz, green trace) and band-pass noise distractors ($\text{aBPN}_{\text{CF=150Hz}}$ and $\text{aBPN}_{\text{CF=1200Hz}}$, red and cyan traces, respectively) compared to baseline (blue trace). Error bars indicate s.e.m. ***(C)*** Mean sensitivity averaged across participants. The effect of the auditory distractors on tactile frequency sensitivity was significant ($F_{3,24}$ = 5.4, P = 0.007) and depended on the frequency content of the distractor ($F_{2,16}$ = 3.7, P = 0.047). ***(D)*** Mean bias averaged across participants. Because auditory distractors were presented with both the standard stimulus and the comparison stimulus, they did not produce a net bias in performance ($F_{3,24}$ = 1.2, P = 0.33).

and sensitivity, respectively. The bias indicates the point of subjective equality while the sensitivity parameter denotes the change in frequency (with respect to the standard) that the participant could detect 73% of the time. The resulting sigmoid ranges from 0 to 1. Participants' ability to discriminate tactile intensity was similarly quantified using a psychometric function.

Statistical tests

For all experiments, we first wished to determine whether the presentation of auditory distractors significantly affected the average estimates of bias and sensitivity on the given tactile discrimination task. Using Experiment 1 as an example, we tested the effect of the distractors using a repeated-measures ANOVA, with distractor condition, including the baseline condition, as the *within-subjects factor*. If this test was significant ($P < 0.05$), we then tested whether the effect of the distractors was significantly modulated by distractor frequency using a repeated-measures ANOVA, with distractor frequency (without the baseline condition) as the *within-subjects factor*. If this test was significant ($P < 0.05$), we then performed *post hoc* 2-tailed paired *t*-tests comparing the estimates of bias and sensitivity at each distractor frequency to the estimates derived from the baseline condition. These tests were adjusted for multiple comparisons using the Bonferroni correction. We excluded data from the analyses if the σ obtained in a given condition fell outside of the inter-quartile range (IQR) plus or minus 2.5 times the IQR. Note that, for large values of σ (i.e. when the psychometric function is essentially flat), the value of μ is meaningless.

Supplementary Results

Discrimination with distractors in both intervals

In this experiment we wished to test whether performance on the tactile frequency discrimination task was affected in a frequency-dependent manner by auditory distractors presented during both the standard and comparison intervals (**Fig. S2*A***). The experimental procedure was identical to frequency discrimination experiment in all other ways. The

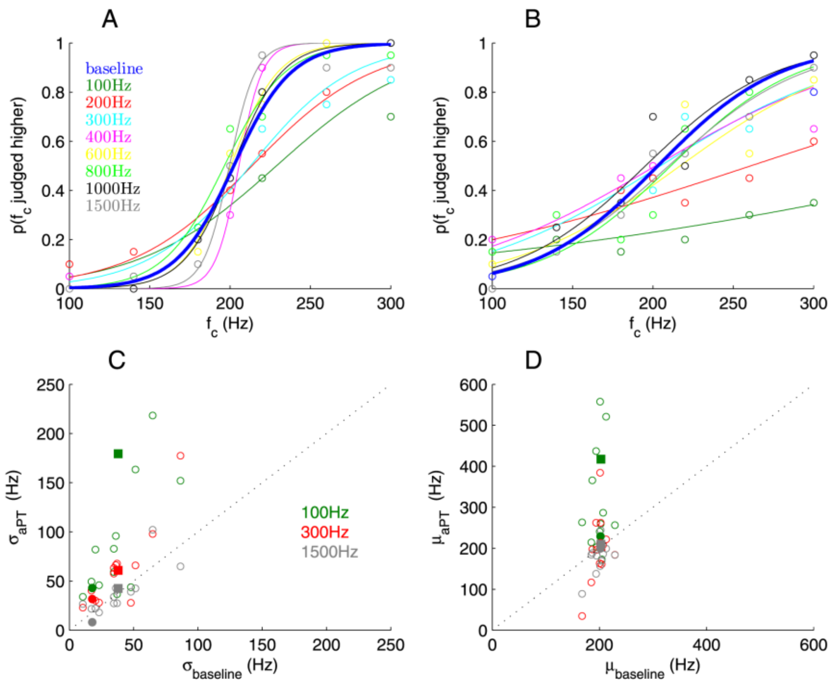

Figure S3 Individual subject differences in the tactile frequency discrimination experiment with the 200-Hz standard. ***(A,B)*** Discrimination performance of two participants. ***(C)*** Measures of sensitivity estimated from three distractor conditions (100-, 300-, and 1500-Hz aPTs) plotted against those estimated from baseline performance for all participants. The data from the example subjects shown in (*A*) and (*B*) are designated by the filled circles and squares, respectively. ***(D)*** Measures of bias. Conventions as in (*C*).

auditory distractors included the 200-Hz aPT, the $aBPN_{CF\ =\ 150Hz}$, and the $aBPN_{CF\ =\ 1200Hz}$. Auditory distractors were equated in perceived intensity to a 200-Hz, 64-dB SPL aPT. Nine subjects (4m5f; mean age = 20.1 ± 2.0 years) participated in this experiment.

Auditory distractors impaired performance when presented with both the standard and the comparison tPTs (**Fig. S2*B***). The effect of the auditory distractors on tactile frequency sensitivity was significant ($F_{3,24}$ = 5.4, P = 0.007; **Fig. S2*C***) and depended on the frequency content of the distractor ($F_{2,16}$ = 3.7, P = 0.047). Because the distractors were presented in both intervals, they did not produce a net bias in performance ($F_{3,24}$ = 1.2, P = 0.33; **Fig. S2*D***). Thus, the frequency-dependence of the audio-tactile interference effect is evident when auditory distractors are presented in the standard and comparison intervals.

<u>Individual subject differences</u>

The degree to which aPT distractors impaired and biased tactile frequency discrimination varied across participants. **Figure S3*A,B*** show the discrimination data of two individual participants. The variability of the effects of aPT distractors on the sensitivity of all participants is shown in **Figure S3*C***, which plots the fitted σ obtained with a subset of aPT distractors (100, 300, and 1500Hz) against the fitted σ obtained in the baseline condition. The variability of the effects of aPT distractors on the bias measure, μ, of all participants is similarly shown in **Figure S3*D***. For reference, the subjects whose data are shown in **Figure S3*A,B*** are designated by the circles and squares, respectively.

<u>Frequency-discrimination, intensity-control</u>

In this experiment, we wished to determine the extent to which the effect of the auditory distractors on tactile frequency discrimination depended on distractor intensity. In the tactile frequency discrimination experiments, the auditory distractors were each presented at one amplitude matched across distractors for perceived intensity. One possibility is that equating distractors for perceived intensity may not have been appropriate. For instance, distractors at different frequencies may have had a comparable effect on discrimination performance had they been equated for objective (as opposed to subjective) intensity. We tested this possibility by presenting a low frequency (200-Hz) and a high frequency (1000-Hz) aPT distractor at four amplitudes, each matched for perceived intensity, during the comparison stimulus while participants performed the tactile frequency discrimination task (**Fig. S5*A***). The 200- and 1000-Hz aPT were presented at amplitudes ranging from 59.6 to 72.9 dB SPL and from 56.1 to 60.2 dB SPL,

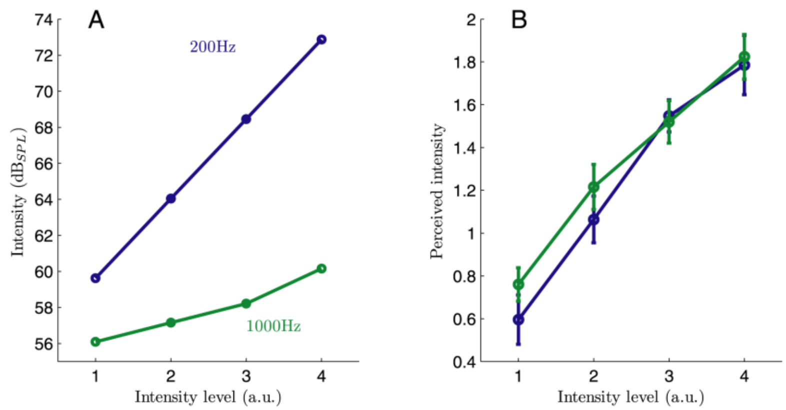

Figure S4 Amplitudes of the auditory stimuli used in *Frequency-discrimination, intensity-control* experiment and their perceived intensities. **(*A*)** Nominal amplitudes for the 200- and 1000-Hz distractors as a function of intensity level. The amplitudes of the auditory distractors spanned a range of behaviorally relevant intensities (loud but not painful). **(*B*)** Average normalized perceived intensity as a function of intensity level. The perceived intensities at each level were similar across frequency conditions, although the 1000-Hz distractors were typically perceived as being slightly more intense ($F_{1,240}$ = 5.4, P = 0.02). The frequency x intensity interaction was not statistically significant ($F_{4,240}$ = 1.7, P = 0.16).

respectively.

The amplitudes of the auditory distractors were determined by the experimenter, but were validated by participants in preliminary measurements using the method of magnitude estimation. The experimenter first matched the perceived intensities of the auditory stimuli and then had participants assign unconstrained magnitude estimates of perceived intensity for each stimulus. Magnitude estimates obtained from each subject were then normalized by the grand mean across all stimulus amplitudes and averaged.

We first verified that the 200- and 1000-Hz aPT distractors were matched in perceived intensity at each of the four intensity levels. Five subjects participated in this experiment. **Figure S4*A*** shows the amplitudes of the 200- and 1000-Hz aPT distractors (blue and green trace, respectively) as a function of intensity level. **Figure S4*B*** shows the normalized intensity ratings of the aPT distractors as a function of intensity level. There was a small but significant main effect of frequency on perceived intensity ($F_{1,240}$ = 5.4, P = 0.02), indicating that the 1000-Hz aPT was actually perceived as slightly *more* intense than its 200-Hz counterpart. Thus, one would predict that the 1000-Hz aPT would have a larger effect on tactile frequency discrimination if the interference depended on intensity. Furthermore, the frequency x intensity interaction was not significant ($F_{4,249}$ = 1.65, P = 0.16).

We then examined the effect of the 200- and 1000-Hz aPT distractors on tactile frequency discrimination as a function of distractor intensity. Ten subjects (9m1f; mean age = 19.7 ± 1.6 years) participated in this experiment. We found that the 200-Hz aPT distractors (red traces) impaired performance whereas the 1000-Hz aPT distractors did not across all stimulus intensities (**Fig. S5*B***, blue traces). The frequency of the distractor had a strong effect on sensitivity ($F_{1,72}$ = 19.1, $P < 10^{-4}$; **Fig. S5*C***), consistent with the results reported in the main text. Critically, neither the main effect of intensity on sensitivity nor the frequency x intensity interaction achieved significance ($F_{3,72}$ = 0.49, P = 0.69 and $F_{3,72}$ = 0.71, P = 0.55, respectively). As was found in the main experiment, neither distractor significantly biased perceived tactile frequency ($F_{1,72}$ = 0.01, P = 0.9; **Fig. S5*D***). In short, the frequency-specific interference effects of aPT distractors on tactile frequency discrimination are preserved across a range of intensities and are relatively insensitive to distractor intensity.

Stimulus onset asynchrony (SOA) control

In this experiment, we wished to determine the extent to which synchronous presentation of auditory and tactile stimuli was necessary for the former to affect the perception of the latter. Three frequencies of the aPT distractors were tested (100, 200, and 300Hz). The auditory distractors were presented at one subjectively-matched intensity level (the same as that used in Experiment 1). This experiment was similar to Experiment 1 with the

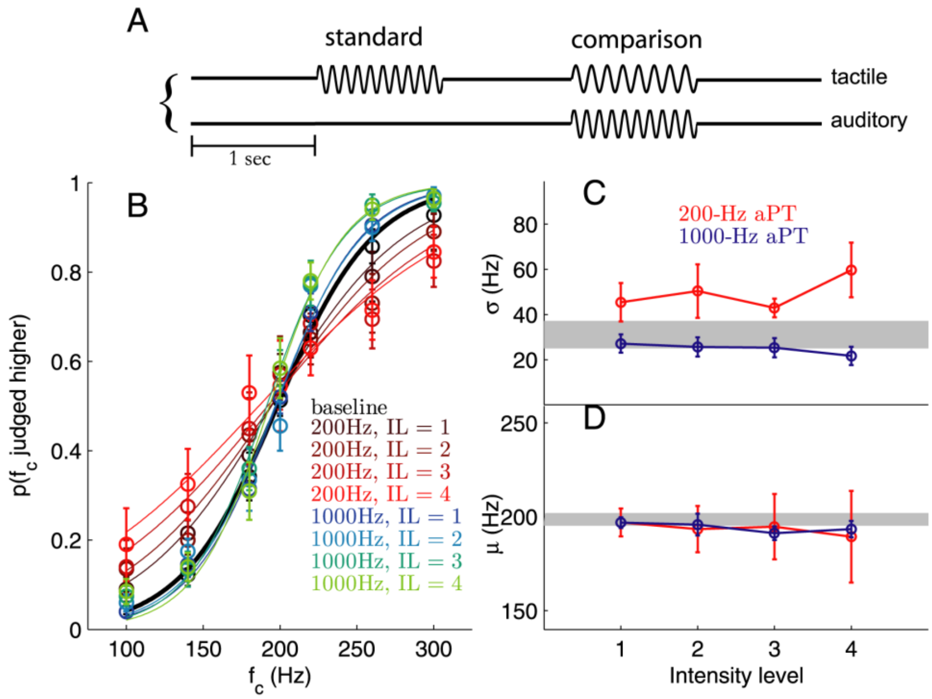

Figure S5 Frequency-discrimination, intensity-control. ***(A)*** Experimental design. ***(B)*** Discrimination performance averaged across participants. Two distractor frequencies (200 and 1000Hz, red and blue traces, respectively) were each presented at four intensity levels (IL, indicated by hue). Baseline performance is denoted by the black trace. Error bars indicate s.e.m. ***(C)*** Mean sensitivity averaged across participants, shown for the 200- and 1000-Hz aPT distractors as a function of distractor intensity. The gray patch indicates the baseline sensitivity ± s.e.m. There was a significant main effect of distractor frequency ($F_{1,72}$ = 19.1, $P < 10^{-4}$). Neither the main effect of distractor intensity nor the frequency x intensity interaction achieved statistical significance ($F_{3,72}$ = 0.49, P = 0.69 and $F_{3,72}$ = 0.71, P = 0.55, respectively). ***(D)*** Mean bias averaged across participants. Conventions as in (*C*). As found in the main experiment with those aPT distractors, there were no significant main effects of distractor frequency ($F_{1,72}$ = 0.1, P = 0.9) or distractor intensity ($F_{3,72}$ = 0.14, P = 0.94). The frequency x intensity interaction was also not significant ($F_{3,72}$ = 0.08, P = 0.97).

exception that, on a subset of trials, the onset of the auditory distractors was 250 msec before and its offset 250 msec after the onset and offset of the tactile stimuli, respectively (the total auditory distractor duration was 1500 msec). Critically, the overlap in the duration of tPT and aPT stimuli was maintained (1000 msec). Nine subjects (4m5f; mean age = 20.3 ± 3.7 years) participated in this experiment.

If the effect depends critically on input timing, i.e., if synchronous presentation of the auditory stimuli interferes more with the task than does asynchronous presentation, the interference effect likely stems from a perceptual binding of two sensory events that are perceived as stemming from the same external source [8]. Another possibility is that the audio-tactile interference effect is independent of onset and offset timing, but is instead determined by the extent to which auditory and tactile inputs simultaneously drive the putative neural populations underlying this convergent sensory process [9]. In this case, one would predict that the magnitude of the audio-tactile interference would be equivalent for both the synchronous and asynchronous auditory distractors, because the duration of overlapping auditory and tactile stimulation is identical.

We compared the effect of three frequencies of aPT distractors presented synchronously and asynchronously with the tactile stimuli during the frequency discrimination task (**Fig. S6*A***). The discrimination data averaged across participants is shown in **Figure S6*B***. While there was a significant main effect of frequency on sensitivity ($F_{3,47}$ = 3.64, P = 0.02; **Fig. S6*C***), neither the main effect of timing-condition (synchronous vs. asynchronous) nor the frequency x timing-condition interaction were statistically significant ($F_{1,47}$ = 1.4, P = 0.25 and $F_{2,47}$ = 0.05, P = 0.95, respectively). Also, while the main effect of distractor frequency on the point of subjective equality was significant ($F_{3,47}$ = 7.1, $P < 10^{-4}$; **Fig.**

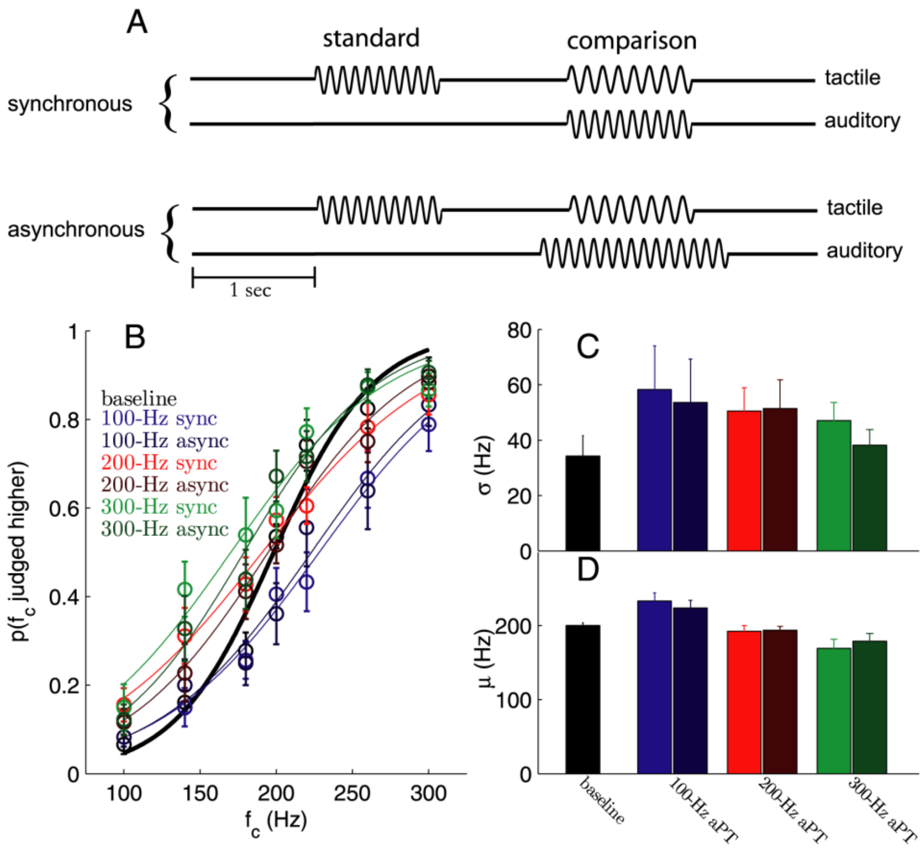

Figure S6 Stimulus onset asynchrony (SOA) control. (***A***) Experimental design. (***B***) Discrimination performance averaged across participants. Distractor frequencies were 100, 200, and 300Hz (blue, red, and green traces, respectively). Timing-condition is indicated by hue. Baseline performance is denoted by the black trace. (***C***) Mean sensitivity averaged across participants. The main effect of frequency on sensitivity was significant ($F_{3,47}$ = 3.64, P = 0.02). Neither the main effect of timing-condition nor the frequency x timing-condition interaction achieved statistical significance ($F_{1,47}$ = 1.4, P = 0.25 and $F_{2,47}$ = 0.05, P = 0.95, respectively). (***D***) Mean bias averaged across participants. The main effect of frequency on bias was significant ($F_{3,47}$ = 7.1, $P < 10^{-4}$). Neither the main effect of timing-condition nor the frequency x timing-condition interaction achieved statistical significance ($F_{1,47}$ = 0.22, P = 0.64 and $F_{2,47}$ = 1.1, P = 0.35, respectively).

S6*D*), neither the main effect of timing-condition nor the frequency x timing-condition interaction was significant ($F_{1,47}$ = 0.22, P = 0.64 and $F_{2,47}$ = 1.1, P = 0.35, respectively). These results indicate that the audio-tactile interference effect is independent of onset and offset timing and likely reflects low-level sensory interactions that do not require perceptual binding of sensory signals.

Intensity-discrimination, intensity-control

Having established in Experiment 3 that perceived tactile intensity was not modulated by the frequency of aPT distractors, we wished to determine whether aPT distractors affect tactile intensity judgments in an intensity-dependent manner (i.e. more intense aPT distractors, regardless of frequency, interfere with tactile intensity judgments to a greater extent). Participants performed tactile intensity discriminations in a 2AFC experiment (**Fig. S7*A***). The frequencies and intensities of the tactile stimuli were identical to those used in Experiment 3. Auditory distractors included the 200- and 1000-Hz aPTs that were used in the *Frequency-discrimination, intensity-control* experiment (see above). Eight participants (4m4f; mean age = 20.3 ± 1.0 years) performed intensity discriminations using the 100-Hz tPTs. Eight participants (3m5f; mean age = 20.4 ± 1.1 years) performed intensity discriminations using the 200-Hz tPTs.

Figure S7*B,C* shows the discrimination data averaged across participants obtained with the 100- and 200-Hz tPTs. At both tPT frequencies, neither the main effect of distractor frequency on sensitivity ($F_{1,66}$ = 3.7, P = 0.06 and $F_{1,66}$ = 3.4, P = 0.07) nor the main effect of distractor intensity on sensitivity ($F_{3,66}$ = 1.5, P = 0.23 and $F_{3,66}$ = 0.86, P = 0.47) was significant (**Fig. S7*D***). Furthermore, neither the main effect of distractor frequency on bias ($F_{1,66}$ = 2.3, P = 0.13 and $F_{1,66}$ = 3.3, P = 0.08)

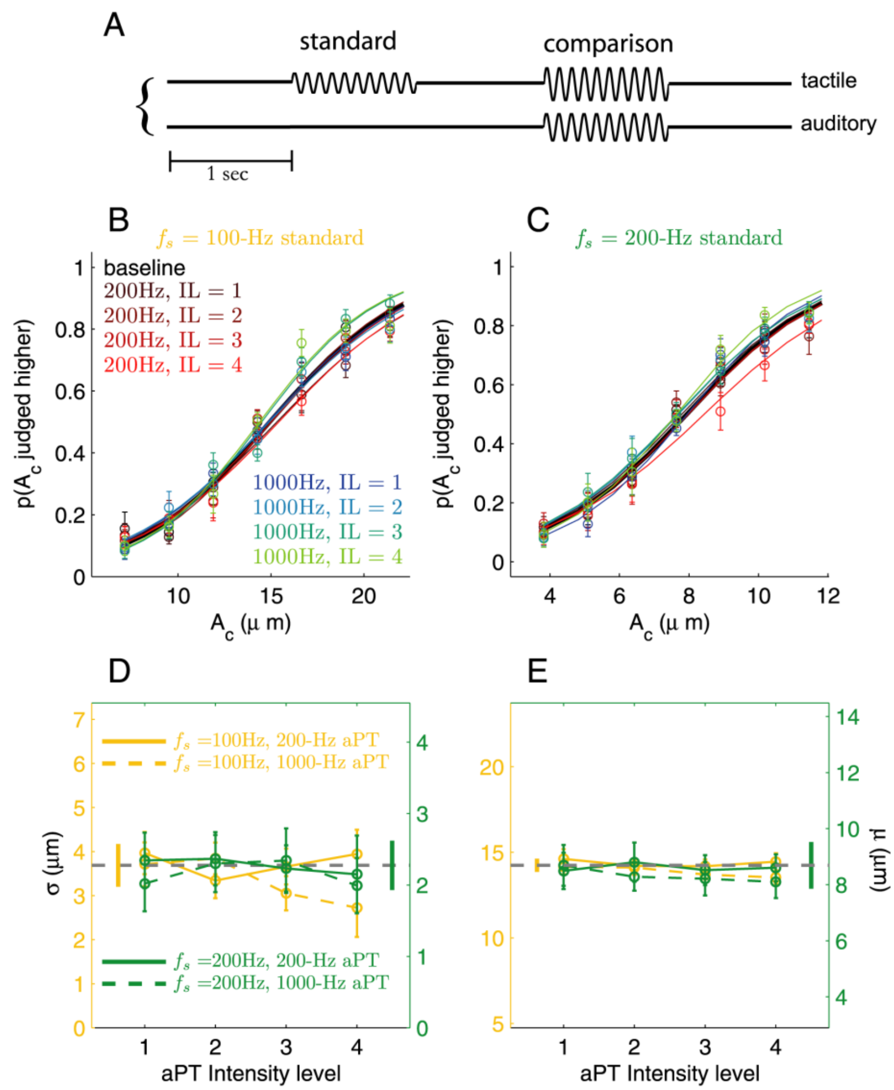

Figure S7 Intensity-discrimination, intensity-control. ***(A)*** Experimental design. ***(B,C)*** Discrimination performance averaged across participants with the 100- and 200-Hz tPT. Conventions as in Fig. S5. ***(D)*** Mean sensitivity averaged across participants with the 200- and 1000-Hz aPT distractors (yellow and green traces, respectively) as a function of distractor intensity. Error bars indicate s.e.m. The dashed gray line corresponds to baseline performance. Untethered bars indicate baseline s.e.m. At both tPT frequencies, neither the main effect of distractor frequency on sensitivity ($F_{1,66}$ = 3.7, P = 0.06 and $F_{1,66}$ = 3.4, P = 0.07) nor the main effect of distractor intensity on sensitivity ($F_{3,66}$ = 1.5, P = 0.23 and $F_{3,66}$ = 0.86, P = 0.47) was significant. ***(E)*** Mean bias averaged across participants in the experiments. Conventions as in (*D*). Neither the main effect of distractor frequency on bias ($F_{1,66}$ = 2.3, P = 0.13 and $F_{1,66}$ = 3.3, P = 0.08) nor the main effect of distractor intensity on bias ($F_{3,66}$ = 0.52, P = 0.67 and $F_{3,66}$ = 0.42, P = 0.74) was significant.

nor the main effect of distractor intensity on bias ($F_{3,66}$ = 0.52, P = 0.67 and $F_{3,66}$ = 0.42, P = 0.74) was significant (**Fig. S7*E***). In short, perceived tactile intensity is neither impaired nor biased by aPT distractors that vary in both intensity and frequency.

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